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PREFATORY NOTE.

THE delay in issuing the Transactions of the Sixth Session of the Intercolonial Medical Congress of Australasia has been caused principally by pressure of work at the Government Printing Office, and also, to some extent, by authors not returning proofs as speedily as they might have done. As the Committee gave authors the privilege of publishing their papers in the various medical journals, the volume of the Transactions becomes more a work of reference. There was no need, therefore, to incur a large expense by having the printing done privately in order to have the volume issued a few months earlier.

The Committee desire to thank all those who assisted in the work of Congress, and especially to the Tasmanian Government for printing the Transactions, to the Government Printer for his unfailing kindness and attention, and to the Press for daily reports of the work of Congress.

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Presidential Address.
Jas. Jamieson, M.D. (Glas.), Melbourne.
Tuberculin as a Specific Remedy for Pulmonary Tuberculosis.
W. C. Wilkinson, M.D., Sydney.
A Plea for the Sanatorium Treatment of Consumption.
A. H. Gault, M.D., Mitcham.
Enlarged Bronchial Glands in Children.
D. McM. Officer, M.D., Melbourne.
Notes on Empyæma.
W. T. Hayward, M.D., Adelaide.
Epidemic Cerebro-Spinal Meningitis.
A. Jarvie Hood, M.B., C.M., Sydney.
The Serum Diagnosis of Disease, with special reference to the Reaction in Typhoid Fever.
S. Jamieson, M.B., C.M., Sydney.
The Aboriginal Medicine of Tasmania.
G. H. Hogg, M.D., Launceston.
The Necessity for the Study of Tropical Medicine in Australia.
F. Goldsmith, M.B., Palmerston.
Tropical Dysentry : Its Pathology.
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Ulceration Granuloma of the Pudenda.
G. V. White, M.B., Ch.B., Thursday Island.
A few Conclusions arrived at consequent upon the Treatment of over 200 cases of Beri-beri.
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Röntgen Rays in the Treatment of some Diseases of the Skin.
W. McMurray, M.D., Sydney.
A case of Skin Disease.
J. A. Hardy, M.R.C.S.E., Hobart.
Widal Reaction : Its Practical Working at the Sydney Hospital.
Cedric Bowker, M.B., B.Ch., and
H. S. Stacy, M.B., B.Ch., Sydney.

SURGERY SECTION.

Presidential Address.
L. E. Barnett, M.B., F.R.C.S. (Eng.), Otago.
The Congenital Factor in Hernia.
R. Hamilton Russell, F.R.C.S. (Eng.), Melbourne.
Six cases of Congenital Hip Dislocation treated by Lorenz's Method of Reduction under Chloroform and subsequent Fixation of Limb in a fully abducted position.
W. A. Wood, M.D., Melbourne.
Dark Sclerotics and Fragilitas Ossium.
C. F. Hodgkinson, M.B., Melbourne.
Some Points in the Treatment of Deformities arising from Anterior Polymyelitis.
W. Kent Hughes, M.R.C.S. (Eng.).
Ulcer of the Urinary Bladder.
H. C. Hinder, M.B.
The Treatment of the Appendix in cases of Appendicitis with Abscess.
W. Moore, M.D., Melbourne.
Some Points in Neptorectomy.
J. B. Nash, M.R.C.S. (Eng.), Sydney.

The use of the Double Thomas Splint for Disease of the Hip Joint.
E. Alan Mackay, M.B., Melbourne.
The Operative Treatment of Enlarged Prostate.
H. C. Hinder, M.B., Sydney.
A case of Repeatedly Recurrent Scirrus of the Breast, treated by Oophrœctomy and Thyroid Feeding, and subsequently by Exposure to the X-rays.
C. E. Todd, M.D., and
J. B. Gunson, M.D., Adelaide.
Prostatectomy.
G. A. Syme, M.B., Melbourne.
Extroversion of the Bladder.
A. A. Lendon, M.D., M.B., Adelaide.
Recent Development in X-ray Apparatus and in the use of the Rays.
W. R. Fox, L.R.C.P., L.R.C.S. (Edin.).
The Röntgen Rays with special reference to Renal Raidiography.
L. H. Harris, M.B., Ch.M., Sydney.
An Operation for Abscess of Tibula.
W. Kent Hughes, M.B., F.R.C.S. (Eng.), Melbourne.
Methods and Management of Circumcision.
A. S. Joske, M.D., Melbourne.

EYE, EAR, AND THROAT SECTION.

Presidential Address.
T. K. Hamilton, M.D., F.R.C.S.I., Adelaide.
The Prognosis and Treatment of Syphilitic Diseases of the Eye.
R. J. Pope, M.D., Sydney.
The Treatment of Middle Ear Suppuration.
R. Arthur, M.D. (Edin.), Sydney.
Cases of small absolute Scotoma caused by Hæmorrhage in the Optic Nerve.
E. Gault, M.B., Melbourne.
Sinus Suppuration.
T. S. Kirkland, M.D., F.R.C.S.E.
Some of the rarer forms of Eye Disease met with in Tasmania.
G. H. Hogg, M.D., Launceston.
Nasal Stenosis due to Deflections of the Septum.
T. K. Hamilton, M.D., F.R.C.S.I., Adelaide.
Notes on Cataract Extraction.
F. W. Mackenzie, M.B., Wellington.
The Operation for Cataract.
W. M. Stenhouse, M.D., Dunedin.
Bifocal Lenses.
T. K. Hamilton, M.D., F.R.C.S.I., Adelaide.
The Examination of Railway Employees in Vision, Colour, Sense, and Hearing.
H. L. Murray, M.R.C.P., Melbourne.
Blindness in Victoria, 1901 (based on asylum returns).
J. J. Fenton, Government Statist, Victoria.
A Factor in the Diagnosis of Hereditary Specific Interstitial Keratitis.
M. Symons, M.D.
Adenoids in Adults.
W. Kent Hughes, M.B., F.R.C.S. (Eng.), Melbourne.

GYNÆCOLOGY SECTION.

Presidential Address.
R. Worrall, M.D., Sydney.
Some Points in Connection with the Gynæcological Surgery of the Round and Broad Ligaments.
Professor A. Watson.
Note on a Specimen of large Coccygeal Tumour in the Fœtus.
R. R. Whishaw, M.B., F.R.C.S.E., Hobart.
A Plea for the more frequent Administration of Chloroform in Confinements.
C. J. Pike, M.B., M.R.C.S., Launceston.
Pelvic Suppuration.
G. R. Adam, M.D., Melbourne.
Some Interesting Gynæcological Cases.
Jas. Hamilton, M.B., Adelaide.
Causation of Ectopic Pregnancy.
G. Horne, M.B., Ch.B., Melbourne.

PUBLIC HEALTH SECTION.

Church Services.

SUNDAY, 16TH FEBRUARY, 1902.

FORENOON.

St. David's Cathedral.

Rev. Reginald Stephen, M.A., Sub-Warden of Trinity College, Melbourne, preached the Congress Sermon to a very large congregation, including His Excellency the Governor and Lady Havelock, in St. David's Anglican Cathedral, Murray-street, Hobart. The President of Congress (Dr. G. H. Butler) and many members of the Intercolonial Medical Congress were also present.

"My meat is to do the will of Him that sent me, and to finish His work."—St. John iv., 34.

The Rev. gentleman, during his eloquent discourse, referred in eulogistic terms to the life and career of a doctor, in which he contended there must be a consciousness of a noble profession—noble in its work and its aims—the relief of human suffering. For the purpose of obtaining much needed knowledge, many a doctor had sacrificed his life as a martyr to science and the cause of humanity, thus enabling many remedies to be discovered in which to counteract the fell diseases flesh was heir to. There was no period of time in the world's history when they had more reason to be proud of the medical profession than at the present. How often did they read of their heroic work in the laboratory, among the plague-stricken, and on the battlefield. They heard thus, however, of but a few, whilst there were many more of whom they did not hear, who were performing equally beneficent and valiant acts, and who, it might be, were even more devoted to the noble cause they were following. And who could speak with a more fulness of knowledge of the self-sacrifice of medical men, and their goodness in ministering to the sick poor, than the clergy, and he, for one, could speak most earnestly of the noble and conscientious work being performed by the members of the medical profession in town and country alike. He referred briefly to the Congress that was to be held during the week, and expressed the hope that the greatest possible good would accrue from the result of their meetings.

EVENING.

St. Andrew's Presbyterian Church.

The Rev. Dr. Scott preached a special sermon to a large congregation. He took for his text

"Lord, to whom shall we go?"—John vi., 68.

His subject was the attitude of the modern mind towards Christ. The preacher pointed out that all had some measure of influence; with some it was greater than with others, their opportunities being more extensive and their example more beneficent. And that was in a high sense true of the medical profession. No other body of men had a firmer hold upon the love and affection of their fellows than doctors, and this was due to the self-sacrificing nature of their work. But the very nature of their calling, on the other hand, subjected them to special drawbacks. Every Christian was aware how important religious privileges were, in order to keep alive the life of faith in the soul. But by the very nature of his work, which engrossed him on the Lord's Day as on other days, the physician was largely cut off from religious privileges, from sanctuary services, from the word and sacrament. The doctor toiled while others worshipped, and by that very fact he was beset by various drawbacks and trials to his faith. But as experience told them in the case of many of the foremost physicians who had also been eminent Christians, those difficulties might be surmounted, and the sick room which he so frequently visited might become to him, as it was so frequently to the sufferer to whom he ministered, a place of spiritual blessing, and so they who served so unceasingly before the altar of suffering, as well as the sufferers themselves, were not left without their reward.

INTERCOLONIAL MEDICAL CONGRESS OF AUSTRALASIA.

SIXTH SESSION.

HOBART, TASMANIA.

FIRST DAY—MONDAY, 17TH FEBRUARY, 1902.

At 10 a.m. members of Congress assembled in the Reception Room, Town Hall, Macquarie-street, for the purpose of entering their names on the Congress roll.

At 11 a.m. a general meeting of the members of the Congress was held in the Town Hall. The retiring President, Dr. John Thomson, of Brisbane, took the chair, *pro. tem.*, supported on the platform by Dr. Gregory Sprott, of Hobart, the General Hon. Secretary; Dr. J. E. Wolfhagen (Hobart), Hon. Treasurer to the Congress; Dr. J. Cooke Verco (Adelaide), and Dr. Sydney Jones (Sydney).

THE PRESIDENT'S APPOINTMENT.

The Chairman said that about two and a half years ago—in September, 1899—it was his privilege, at the Congress in Brisbane, to congratulate the members on the selection of the president. The lot fell upon Richard S. Bright, and he still recollected the strong and hearty applause with which the name was received. He—and, no doubt, a great many others of those present—had looked forward to this meeting to continue the friendship so pleasantly begun in the Northern capital. But it was not to be. His esteemed friends present would pardon him if he said that that meeting had been shorn of one of its attractions in the loss of their friend, Dr. Bright. He passed away quietly and painlessly on an October morning. He was held in universal respect by the community, and esteemed by his professional brethren. He died in the fulness of years—but not a very old man—in harness; and what more could a man desire? The executive committee had appointed the Hon. Dr. Gamaliel H. Butler, M.L.C., to the chair. Of course, that appointment had to be now confirmed by the Congress. That was why, for a few seconds he (Dr. Thomson) occupied that position. The Secretary said there was a little work to be done that morning—the report of the Executive Committee was to be brought up.

EXECUTIVE REPORT.

The General Secretary (DR. G. SPROTT) then read the following Report of the Executive Committee :—

At the close of the Bribsane meeting, it was decided that the sixth session of Congress should be held in Hobart, and Dr. R. S. Bright was unanimously elected President. As early as June 6, 1900, the President called upon the members of the Medical Section of the Royal Society in Hobart, and those of the Launceston Branch of the British Medical Association, to initiate the work of Congress, and at this meeting an executive committee was appointed, with Dr. G. H. Butler as Hon. Treasurer, and Dr. G. Sprott as Hon. Secretary. The following gentlemen consented to act as local Secretaries :—South Australia : Mr. J. B. Gunson, M.B. Victoria : Mr. G. Adlington Syme, M.B., F.R.C.S. (Eng.). New South Wales : Mr. Philip E. Muskett, L.R.C.P. and S. (Edin.). New Zealand : Professor John H. Scott, M.D. (Edin.). West Australia : Mr. Athelstan J. H. Shaw, M.D. (Camb.). Queensland : Mr. Wilton Love, M.B. (Edin.). The duties falling to these gentlemen have been carried out in a most energetic and satisfactory manner, and the committee desired to record their hearty appreciation of the services rendered by them.

As this was the first meeting since the inauguration of the Australian Commonwealth, it was decided to ask the Governor-General to become the patron of the Congress, a request to which he graciously acceded.

Following the custom of previous Congresses, it was decided to ask the Hon. the Premier of Tasmania to invite Government delegates from the other States, and the following gentlemen were appointed by their respective Governments :—Dr. John Thomson, Queensland; Dr. W. G. Armstrong, New South Wales; Dr. T. Cherry, Victoria; Dr. W. T. Hayward, South Australia; Dr. T. H. Lovegrove, Western Australia; Dr. J. M. Mason, New Zealand; Dr. G. Sprott, Tasmania. Owing to fresh outbreak of plague in Sydney, Dr. W. G. Armstrong was unable to be present.

As the work of the Public Health Section promised to be both arduous and interesting, the Mayors of capital cities, and the President of the Metropolitan Boards of Water Supply and Sewage, Sydney, were asked to send their medical advisers to take part in the discussions, the Melbourne City Council being represented by Dr. James Jamieson, and the Sydney Metropolitan Board of Water Supply and Sewage by Dr. T. M. Kendall.

The committee desire to record their appreciation of the great assistance they have received from the Tasmanian Government and from the railway authorities of the other States and New Zealand, in allowing considerable concessions as regards railway fares. The various steamship companies have also rendered assistance in this way.

The only work handed over by the Brisbane Congress was that relating to the formation of a board of medical officers as an advisory body in connection with the Army Medical Corps, and also a resolution with regard to the abuse of charitable institutions.

As these resolutions have been brought under the notice of their respective Governments by their delegates to the Brisbane Congress, it was not thought advisable by this committee to take further steps in the matter.

The committee have also to report that, acting according to the resolution moved by Dr. Worrall at a special afternoon meeting, held at the Brisbane Congress, a Medical Defence Association has been formed in Tasmania, Queensland, and West Australia.

As regards the work in connection with this Congress, there are the usual six Sections. The subject for general discussion is that of cancer, and numerous papers have been promised. The committee wish specially to acknowledge the splendid services rendered by Professor H. B. Allen, of Melbourne, who will open this discussion.

Various suggestions have been made—one by the West Australian Branch of the B.M.A.—with regard to the establishment of a Section for medical ethics and politics, unfortunately came too late to be acted upon, but the matter may be brought forward at the general meeting of congress.

The change of name of the Intercolonial Medical Congress to one indicated by the new order of things as regards colonies has been discussed, but it was felt by the committee to be a matter for decision by the general meeting of Congress. An opportunity will be given members to discuss this matter at a future meeting.

Almost at the completion of the committee's preparatory work the sudden and much-regretted death of the President-Elect deprived the committee of its most enthusiastic and energetic worker—one who had carried on the work to the day of his death.

At a subsequent meeting the Hon. Dr. G. H. Butler was elected as acting President, and the members of Congress will now be asked to endorse the choice of the committee. As by the election of the Hon. Dr. Butler, a vacancy was created in the Treasurership, Dr. J. E. Wolfhagen was elected as Hon. Treasurer.

Yet another worker—Dr. J. G. Johnson, of Evandale—who was acting as joint Secretary in the Section for Midwifery and Gynæcology, was removed by the hand of death, after he had rendered valuable service in the organisation of that Section. His death is much regretted.

Appended is a balance-sheet, as forwarded by Hon. Dr. Taylor, of Brisbane, which the Treasurer will now read.

BALANCE-SHEET.

The Hon. Treasurer (Dr. Wolfhagen) read the following balance-sheet :—To balance from Congress of 1896, £54 3s. 11d.: members' subscriptions (354 at 21s.), £371 14s.: exchange remitted, £3 4s. 9d.—£429 2s. 8d. Sundry payments as per accounts, £313 19s. 2d.; exchange on New Zealand draft, 5s. 7d.; exchange paid on cheques, £2 11s. 9d.; bank charges, £1 10s.; balance in bank, £110 16s. 2d.—£429 2s. 8d.

Dr. Wolfhagen added that the Treasurer of the Brisbane Congress had handed over a sum of £109, which would go to the credit of this Congress. (Applause.)

The Chairman moved that the report and balance-sheet be adopted.

Dr. Verco (S.A.) seconded the motion, which was passed with applause.

The New President.

Dr. Thomson then announced that the Hon. Dr. Butler had been appointed President of the Congress, and vacated the chair in his favour. (Applause.)

The President, who, on taking the presidential chair, was greeted with loud applause, said :—" Gentlemen, for the great honour you have conferred on me I cannot express the gratitude I feel. I cannot say unreservedly that I take the chair with pleasure—the circumstances so feelingly explained by Dr. Thomson prevent any expression of pleasure. Dr. Thomson had said that he and his brother visitors miss the one who should have been in the chair. Much as you miss him, your feeling, is infinitesimal, compared with the loss of us, who knew him best, and worked with him, for he had completely won our hearts. He was a man we all looked up to as our guide, philosopher, and friend—he was so regarded by the whole of the profession in Tasmania. There was no medical man in this State more beloved than Dr. Bright, our late President. (Applause.) Had he been here, he would have been of great service to Congress, not only in the work, but also in the pleasure portion of the meetings. I will not anticipate anything I may have to say to-night, especially as to-day's meeting is more of a preliminary canter to get the medical men together, and the work in order. I again thank you, and trust I will be able to carry out the presidential duties successfully." (Applause.)

Condolence with Mrs. Bright.

Dr. Todd (Adelaide) said it was his privilege to move that a vote of condolence be passed with Mrs. R. S. Bright, on the death of their late President. Those of them who had been in the habit—as he had—of visiting the beautiful city of Hobart periodically, would have a grateful recollection of the universal kindness of Dr. Bright. Those who had accepted his hospitality would remember the gracious lady who for so many years helped him in his public, no less than in his private work. To that gentle lady their sympathies went out at this time. He moved the vote of condolence to her.

Dr. Thomson (Brisbane) said he could not say he had pleasure in seconding the resolution, but it gave him much satisfaction to do so. He had hoped to see the kindly face of Dr. Bright when he visited Tasmania, and he felt that there was a great gap in their gathering.

The resolution was carried in silence, all up-standing.

Sight Tests for Railway Employees.

The President, having announced that any member could bring forward any matter deemed of general interest, and not in the programme—

Dr. Murray (Melbourne) said he had a subject which he thought of general interest—the testing of the eyesight of railway employees. He considered that the present method of sight-testing employed in the Railway Departments of New South Wales and Victoria was quite inadequate. He moved,—" (1) That all employees on railway lines, or in any way connected with railway traffic, should be examined periodically by medical men skilled in eye work; (2) that the so-called practical test in use in New South Wales and Victoria be abolished, as it is unscientific and inaccurate; (3) that all candidates for railway service should be examined with a view to their permanent fitness.

It was pointed out that the proper course was to refer the motion to the Eye, Ear, &c., Section of Congress, to consider and report, and this course was adopted.

Dr. Woodward (Sydney) said the tests of the railway employees in New South Wales were quite satisfactory. He had done the work for years.

Commonwealth Army Officers.

Dr. Sydney Jones (Sydney) said there was one subject that he thought should be considered by the Congress, as it was of interest to every medical man throughout the Commonwealth. He referred to the proposal to transfer of Colonel Dr. Williams from the Medical Army Corps in New South Wales to a more important position under the Commonwealth Government, at a reduced salary. Colonel Williams had been appointed Director-General of the Army Medical Service of the Commonwealth. (Applause.) That was very satisfactory, but the unsatisfactory part of it was that whilst Colonel Williams had a salary of £900 whilst in the service of New South Wales, his salary under the Commonwealth would be reduced to £850. Whilst the services were increased, and position improved, the salary was reduced. This would entail a corresponding decrease in the salary of every medical man in the service, not alone under the Commonwealth, but also in the States, and he (Dr. Jones) regarded it as another step in the direction of cutting down the remuneration of the medical profession—a process that had been in operation for some time, and against which they should take a stand, for the result would be the employment in the service of men of less efficiency and less education. (Applause.) He moved that the following committee be appointed to consider the subject, and to

report thereon to Congress, with the object of making representation to the proper authorities :—The President, Professor Allen, Dr. Watson, Dr. Jno. Thomson, and the mover. (Applause.)

Professor Allen (Melbourne) agreed that it was desirable for adequate remuneration to be paid to the Director-General. Colonel Williams had received a flattering invitation from the Imperial Government to resume duty in South Africa, with extensive powers, but he had been called upon by the Commandant of Australia to undertake the reorganisation of the Australian Medical Service. Under those circumstances Colonel Williams was entitled to adequate remuneration for his services.

Dr. Woodward (Sydney) seconded the motion, but said he would prefer to see one or two army men on the committee.

After further discussion, in which general approval was expressed with regard to the appointment of a committee, the name of Dr. J. G. Hamilton, of Adelaide, was substituted for that of Dr. Thomson (the latter not desiring to be a member, owing to his connection with the Queensland Defence Force), and the motion was agreed to.

Adjournment.

The meeting for transacting general business then adjourned till Saturday morning.

President's Garden Party.

The President of the Congress (Hon. G. H. Butler) and Mrs. Butler gave a garden party during the afternoon on the Elwick racecourse. A special train carried six hundred ladies and gentlemen to the course, which was looking at its best, and the visitors were loud in their praises of the surrounding scenery. Dr. and Mrs. Butler received their guests at the entrance to the racecourse, and extended to each a cordial greeting. Refreshments were served in several large marquees, and the function was altogether a brilliant success.

Inaugural Ceremony.

The official opening of the Intercolonial Medical Congress took place in the Lecture Hall at the Town Hall at 8.30 p.m. The Hall was crowded, ladies being *en evidence*.

His Excellency the Governor, Sir Arthur E. Havelock, presided, being accompanied by Lady Havelock and suite. There were on the platform with His Excellency :—The President of the Congress (Hon. Dr. Butler, M.L.C.), the Chief Justice (Sir John Dodds), the Mayor of Hobart (Alderman Kerr), the Premier (Hon. N. E. Lewis, C.M.G.), the Chief Secretary (Hon. G. T. Collins), President of the Legislative Council (Hon. Adye Douglas), Speaker of the House of Assembly (Hon. Nicholas J. Brown), Mr. Justice McIntyre, the following past Presidents of the Congress—Drs. Sydney Jones, N.S.W.; Thomson, Queensland; and Verco, S.A.; the following representatives of State Governments—Drs. Hayward, Adelaide; Cherry, Victoria; Mason, New Zealand; Lovegrove, West Australia; Sprott (General Secretary), Tasmania; Professor Allen, Melbourne; Rev. Geo. Clarke, Chancellor of the University of Tasmania; Rev. Dr. Scott. Amongst those in the audience were :—Hon. B. S. Bird, Mrs. and Miss Bird, Hon. E. Mulcahy and Mrs. Mulcahy, Mrs. N. E. Lewis, Mrs. G. T. Collins, Miss Collins, and Mrs. Dr. Butler.

The President invited Sir Arthur Havelock to open the Sixth Session of the Medical Congress.

His Excellency, who was received with loud applause, said :—"Mr. President, Ladies, and Gentlemen,—It was hoped that His Excellency the Governor-General, who is, as you know, Patron of the Intercolonial Medical Congress, would have been able to open this session, and an invitation was sent to him, asking His Excellency to do so. His Excellency, while thanking the Committee, expressed his great regret that he was prevented from having the pleasure of availing himself of the invitation, as he was unable to leave Melbourne at the time fixed for opening the Congress. The Governor-General, at the same time, heartily concurred with the suggestion made by the Committee, that, in case he should be unable to be present, the Governor of Tasmania should be asked to open the Congress. (Applause.) It is with great pleasure that I have acceded to the wish of the President and Committee, that I should fill this honourable position in the proceedings of this Session, and I feel proud to be the representative of His Excellency the Governor-General in this important and interesting ceremony. I have pleasure in offering a hearty welcome to the gentlemen who have assembled here from all parts of Australia, to

be present at this Congress. (Applause.) An outline of the proposed proceedings of the Session is set forth in the printed programme before us. The subjects to be considered and discussed are numerous, and of the greatest importance and interest, comprising, as they do, the branches of medical, surgical, and sanitary science. I am persuaded that the deliberations of Congress will result in the advancement of science—(applause)—and I trust that those members of this noble profession, who are now visitors, will derive pleasure, as well as advantage, from their sojourn in Tasmania. (Applause.) Mr. President, Ladies, and Gentlemen, I declare this Session of the Medical Congress to be duly opened." (Applause.)

The President invited the Premier to welcome the visitors.

The Premier (Hon. N. E. Lewis, C.M.G.), who was also received with applause, said :—"Your Excellency, Mr. President, Ladies and Gentlemen,—On behalf of the Government and the people of Tasmania, I desire to tender to the members of the Intercolonial Medical Congress a hearty and cordial welcome to Tasmania on this, their first, visit to our shores. (Applause.) We deeply regret that the President-elect (the late Dr. Bright) has been called to his rest. For forty years he worked amongst us; he tended the sick and suffering in the Hobart Hospital; that institution he fostered and tended as his own, and many an hour he gave gratuitously and ungrudgingly to those who were unable to pay medical fees. (Applause.) He left a name which will long be honoured and revered amongst the people of Tasmania. (Applause.) In his successor (Dr. Butler) you will have a worthy successor. (Cheers.) He has endeared himself to us by his many qualities—by his professional status, by his interest in our social, sporting, and political life; and he has that geniality and at the same time that power, to command, which will, I am sure, fit him to preside worthily over such an august assembly as the Congress now declared open by His Excellency. (Applause.) Much is expected from the Congress by the people of the Commonwealth and New Zealand, and I have little fear that their expectations will not be realised. From a Congress such as this much is gained. It is not merely the preparation and reading of papers; it is much more. The bringing together, in close personal contact, of members of the profession from all parts of the States, must result in good. Minds are brought into contact with other minds, knowledge with knowledge, and experience with experience; and after the work of the Congress the professional men attending it will return to their spheres of labour better fitted to deal with the difficulties with which they are brought face to face. I am confident that not only will the professional men be benefited by such meetings, but the people of the States will also derive profit therefrom. (Applause.) We hope that the visitors also will enjoy at least some pleasure during their visit. We regard Tasmania not only as a pleasure resort, but also as a health resort—(applause)—and I trust that one of the results of this Congress will be that the professional men of the mainland will prescribe for their patients at least one trip to Tasmania. (Applause.) I hope that this Congress will afford not only profit, but also pleasure, to everyone connected with it." (Applause.)

The President invited His Worship the Mayor (Ald. G. Kerr) to welcome the visitors.

His Worship read the following address of welcome :—Your Excellency, Mr. President, Ladies and Gentlemen,—It is only a few weeks since that I had the pleasure of welcoming to our city a large number of ladies and gentlemen, who had met here for the discussion of questions of general scientific interest. It is again my privilege as Mayor to extend a very hearty and cordial welcome to the distinguished medical gentlemen who have now assembled at Hobart for the purpose of holding a Medical Congress. My connection with the Hobart Hospital Board, as one of its members, has given me an opportunity of becoming acquainted with the self-sacrificing efforts of the medical profession in doing battle against disease and suffering. It is a matter of extreme regret to me, as I am sure it is to you all, that our late esteemed friend, Dr. Bright, is not here with us. We, in Hobart, can never forget the great public service rendered by him. The citizens owe him a debt of gratitude for his untiring and devoted services to the Hobart Hospital, extending over a period of forty years. We remember the deep interest he took in the building of the operating theatre, and in all matters that would benefit the patients, and improve the management of the institution. His deep interest in the work of this Congress is well known to those who have worked so hard with him to make this meeting the success it no doubt will be. I am sure your General Secretary and local brethren have spared no efforts to bring this meeting to a very successful issue. (Applause.) There are few callings that command so much respect and esteem as the medical profession. From infancy to old age the body is continually getting out of repair—(laughter)—and we require the services of our good friends, the doctors, to put us right. Medical men have many trying experiences. Day and night they have to turn out in all weathers, no matter how tired they may be. They are ever ready to respond to the call of duty. Ian Maclaren, in his inimitable sketch of the good Scotch

doctor, William McLure, has given us a faithful and true character of the profession generally, and my own experience confirms his testimony. Here, in Tasmania, we are blessed with a splendid climate, and our citizens live to a good old age. We have many natural advantages, and as we are now considering the question of underground drainage, we will be pleased to see the Congress taking this matter into consideration, from a sanitary point of view. Gentlemen, I will not detain you. Yours is a great and noble work. May your deliberations have the Divine blessing. God grant you may be successful in discovering some cure for the two terrible diseases that are to have your special consideration. I again extend to you a cordial and hearty welcome on behalf of the citizens, and trust that your stay in Hobart will be pleasant and agreeable to yourselves, and profitable to the suffering sick folk. (Applause.) You will find the residents of Hobart genial, hospitable, and kind-hearted. One and all are anxious to make you feel that you are not strangers, but that you are among a people who esteem you highly as fellow-workers in the great cause of humanity. I shall be pleased to be of any service to you during your stay in our city. (Applause.)

Presidential Address.

The President (Hon. G. H. Butler, M.R.C.S. (Eng.), L.R.C.P. (Lond.), M.L.C.), then rose to deliver his address. He was greeted with rounds of applause. When it had subsided Dr. Butler said :—" While extending to our visitors a hearty welcome to Tasmania, I must express my gratitude to the members of Congress for the great honour done me by electing me to preside over this distinguished gathering. Nevertheless, I take the Presidential chair with the utmost regret, owing to the circumstances which have made it necessary to elect a new President. A little over two years ago, at the Brisbane meeting, the late Dr. Bright invited you to hold the next session of Congress at Hobart, and the members assembled unanimously elected him President. From that time till the day of his death he was a most ardent and zealous worker in all Congress matters. His death has been keenly felt by the Executive Committee during the last two months, when they most needed his general knowledge and experience to guide them. It is, indeed, but little to say, that he had entered into the work of Congress determined that no effort on his part should be wanting to make this meeting a great success. Not only as President of Congress, but in every other way, do we, in Hobart, miss him. He was an experienced and respected practitioner, whose advice and assistance were frequently sought by younger practitioners, who ever found him willing to assist them with the knowledge he had gained by his long experience and successful career.

It is fitting also here to refer to a death which recently took place in Hobart—that of one of the Vice-Patrons, Sir James Agnew, M.D., K.C.M.G. Although unable to take an active part on the work of Congress, he was much concerned for its interest and welfare, and we were all hopeful he might have been spared to have been with us this week. Within the last few weeks death has removed one of our sectional secretaries, in the person of Dr. J. G. Johnson, of Evandale. He was one of those who attended the first meeting held to consider the work the Congress might do in Tasmania. From that time until failing health prevented, he took an active part in the work of the Midwifery and Gynæcological Section. In addition to being an energetic and active worker, he was of a genial disposition, which rendered him a great favourite among his professional brethren.

There are others whom we shall miss from this meeting : our esteemed Vice-President, Dr. Willis Way, who was well known to most of us, and whose sudden death we all deplore, also others less known, whose memories will ever remain with us. I refer especially to those who lost their lives in the Empire's cause during the present South African War. We know how the services of the Australian and New Zealand Army and Medical Corps were appreciated by the Home authorities, and it is gratifying indeed that in our profession there was no lack of volunteers for this work. We sympathise with those who mourn for the loss of a loved one, and give a hearty welcome to those who have returned to their homes, some of whom are with us to-night crowned with distinction and honour.

When we turn to the work of Congress, it is perhaps to be regretted that the usual inaugural address could not be given. The late President had to a large extent prepared his address, but the time since his death was altogether too short for me to prepare one worthy of this great occasion. While Presidential addresses are sometimes lengthy, and may even be tedious, they are nevertheless instructive. I hope the present omission will in no way establish a precedent.

I think, however, the work to be done in the Sections, together with the general discussion on cancer, will occupy our full time. From the promises given of papers there will be enough to do in sectional work, and the volume of information supplied to us by Professor H. B. Allen in his opening remarks on cancer will require our most earnest and serious consideration. It was very gratifying

to the Committee to know that after the subject of cancer had been selected for general discussion, among the first wishes expressed by His Majesty the King was that scientists should strenuously endeavour to discover the cause and cure of cancer. It is not anticipated that any very definite conclusions will be arrived at during this discussion, but it is hoped that sufficient interest will be aroused among members of the profession to ensure further scientific investigation in this very important subject, and that good ground work will be done which will form a solid basis for further scientific inquiries. It has been suggested that an Investigation Committee might be formed at the close of the discussion. The suggestion is a good one, and might well be acted upon.

And here I would urge one word of caution, and that is, that Congress should not be hasty in arriving at any conclusions unless they are proved scientifically correct. There is no doubt that the work of such a Congress as this largely influences public opinion, and that being so, it should be able to bear the most severe criticism.

There are many subjects besides cancer on which an expression of opinion would be very desirable. I refer more particularly to the open-air treatment of consumption, and the responsibilities of the States to provide sanitoria for the treatment of this disease. It is practically settled that the treatment of consumption must be to some extent a national movement, but as to how this can be best carried out is still a matter for consideration. With Federal Australia we can reasonably hope to have in the near future a Federal Health Department with uniform laws relating not only to quarantine, but to other matters appertaining to the public health. There is, for instance, the much-vexed question of compulsory vaccination. While we have in one State a law for compulsory vaccination rigidly carried out, in many of the other States it is either indifferently complied with or not carried out at all. It is much to be desired that the Central Health Department should urge upon the various States to adopt a uniform system of vaccination to protect the public against smallpox, rather than rely upon the present system of quarantine; for, most assuredly, the time is not far distant when it will be found that that system in itself is insufficient to prevent the introduction of smallpox into a colony in which there are so many unvaccinated people as there are in this State.

The need of a section where matters such as the one under review could be discussed no doubt prompted the members of the British Medical Association of Western Australia to move that a section be formed for the discussion of medical politics and ethics. This suggestion arrived too late for such a section to be arranged for at this meeting, but inasmuch as it appears to be an excellent one, I hope that the Committee of the next Congress will not overlook it. We know that politicians enact laws the full significance of which they are not always fully cognisant of at the time. Take, for instance, the Compulsory Notification of Infectious Diseases. We find in some of the States a reasonable fee is paid, but in our own medical men are compelled to report all cases without fee or reward, and are under a heavy penalty if they neglect to do so within twenty-four hours.

The ethics of the profession is a branch in our training as medical men very sadly neglected in the universities and medical schools of the present day. I believe that many of the "laches" of some practitioners are due to want of knowledge rather than wilful disregard of professional courtesy. A section in which the difficulties one encounters in routine and general work could be discussed would prove a very useful one, for it must be admitted there is a tendency in the present day to overlook many of the old and desirable rules which have hitherto guided medical men in their professional dealings with one another.

These, gentlemen, are some of the subjects which may be dealt with by this Congress.

There is also a matter of great importance which must be considered during this week, and that is the advisability of changing the name of the Congress and altering the constitution of the Council. Immediately after the inauguration of the Commonwealth the Committee considered the desirability of altering the name "intercolonial," which seemed to be somewhat of a misnomer under present conditions. The committee came to the conclusion, however, that they had no power to alter the name, even if it was thought desirable to do so. They therefore decided to invite discussion as to what would be a more suitable name to bestow on this important Association.

It would also be advisable to consider whether the Congress could not be more satisfactorily carried out by the appointment of a permanent Committee with representatives in each State or colony. At a later meeting an opportunity will be given you of saying whether any alteration should take place, and, if so, in what direction. A motion will be moved for the formation of an Australasian Medical Association, or Congress, which will give members an opportunity of ventilating their opinions, and it is hoped that after considering the matters from every aspect some definite and suitable arrangement will be arrived at.

It is now my very pleasing duty, on behalf of Tasmanian members, to welcome you to our State. I hope you will all thoroughly enjoy your visit to our island, and trust that its natural beauties and the genuine and hearty welcome which its people extend to you will make it as enjoyable as it is likely to be profitable. This wish will be fully realised, I am sure, if we are exempt from those atmospheric disturbances which our friend, Mr. Wragge, usually favours us with when they are least desired. Our professional community is very small, and I am sure you do not expect great things from us. I know it was rather bold of us to invite you here, but we feel sure that the resources of medical men to find enjoyment wherever they are placed will help to carry us through. We trust that you will all return to your homes benefited in health, and with kindly remembrances of having spent a pleasant week.

On behalf of the profession I welcome you to Tasmania. (Loud applause.)

The retiring President (Dr. Jno. Thompson, of Brisbane) moved a hearty vote of thanks to His Excellency for not only coming to the meeting, and taking the chair, but also for his kindly words and practical sympathy with the Congress. He (the speaker) had learned since he had come to Hobart that His Excellency had already won golden opinions from every section of the community —(prolonged applause)—for the interest he displayed in everything connected with Tasmania, and the comfort and welfare of the people. (Renewed applause.) The King—their Royal Master—God bless him—was a very distinguished Fellow of the Royal College of Surgeons in London; he did not know whether the King was a general practitioner—(laughter)—but he was sure he was a consultant, as he numbered among his intimate friends a few of the leading men of the medical profession in the old country, and took a deep interest in the work of his medical brethren. (Applause.)

The motion was passed with enthusiastic applause.

Professor Allen moved a hearty vote of thanks to the Premier and the Mayor of Hobart for their kind words of welcome. The members of Congress brought their views and high thinking before the highest medical tribunal in the Southern Hemisphere. They had to thank the Government for aid in printing and publishing records of their proceedings. The Government Printer deserved to be complimented for the manner in which he had brought out some complicated statistics, which he (the speaker) had to lay before Congress next day. The Mayor was well known to them as an old member of the Hobart Hospital Board, and a philanthropic worker, and so they could feel that his welcome was a real one, and he thanked him most heartily for it. (Applause.)

The proceedings then terminated. Mr. T. Julian Haywood, who presided at the organ, played Marshall's "Commemoration March" as the large gathering left the hall,

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The Reception.

The President and Executive Committee held a reception in the Royal Society's rooms at the Museum at 9 p.m., there being some seven hundred present, including a party from Government House, Ministers of the Crown, and other influential residents. The scene at 10 o'clock was most picturesque, the decorations and furnishings being on a lavish scale, and the reception was unanimously regarded as one of the most enjoyable ever held in Hobart.

SECOND DAY—TUESDAY, FEBRUARY 18, 1902.

At 10 p.m., in the reception-room at the Town Hall, Dr. James Jamieson, of Melbourne, President of the Section of Medicine, delivered his Presidential Address on "The Significance of the Term 'Cure' in Medicine," in the presence of about one hundred and thirty members of the Congress.

On the motion of Dr. Butler, President of the Congress, a hearty vote of thanks to Dr. Jamieson was carried by acclamation at the conclusion of the address.

At 10.45 a.m. the various Sections met in the Sectional rooms set apart for their use, when the following papers were read and discussed :—

Section of Medicine.

School of Tropical Medicine in Australia.

Proposed by Dr. F. Goldsmith (Port Darwin), seconded by Dr. W. T. Hayward (Adelaide,—"That, in view of the excellent work being done by the Schools of Tropical Medicine in London and Liverpool, it is desirable that a similar institution be formed in Australia for the systematic and scientific investigation of tropical diseases in our continent; and that a committee be appointed consisting of Dr. Ham (Brisbane), Dr. Blackburn (Sydney), and Dr. Goldsmith (Port Darwin) to consider the best method of procedure, and to report on the same at a later meeting of the Medical Section, and, if adopted by the Section, to be sent on to the general meeting of Congress."—Carried.

Notes on Empyema.
Dr. W. T. Hayward (Adelaide).

An interesting discussion followed, in which Drs. Sydney Jamieson, Howard, Verco, Jarvie Hood, Camac Wilkinson, Johnson, Eady, Lomson, Officer, and others took part.

Enlarged Bronchial Glands in Children.
Dr. D. M. Officer (Melbourne).
Dr. Wilkinson spoke on the subject.

Tuberculin as a Specific Remedy for Pulmonary Tuberculosis.
Dr. Camac Wilkinson (Sydney).
Discussion on this paper was postponed till Thursday, 20th February.

Section of Surgery.

Prostatectomy.
Mr. G. A. Syme, M.B. (Melb.), F.R.C.S. (Eng.), (Melbourne).

The Operative Treatment of Enlarged Prostate.
Mr. H. Critchley Hinder, M.B., M.Ch. (Syd.), (Sydney).

Some Points on the Treatment of Deformities Arising from Anterior Polymyelitis.
W. Kent Hughes, M.B. (Lond.), M.R.C.S. (Eng.), (Melbourne).

Section of Eye, Ear, and Throat.

The President's Address.
Dr. T. K. Hamilton (Adelaide).

The Prognosis and Treatment of Specific Affections of the Eye.
Dr. R. Pope (Sydney).

Eye Scotoma.
Dr. E. Gault (Melbourne).

Ophthalmia.
Dr. W. Kent Hughes (Melbourne).

Section of Midwifery and Gynæcology.

Some Points in Connection with the Gynæcology Surgery of the Round and Broad Ligaments.
Prof. Watson (Adelaide).

Note on a Specimen of Large Coccygeal Tumour in the Fœtus.
Dr. R. R. Whishaw (Hobart).

A Plea for the More Frequent Use of Chloroform in Confinement.
Dr. C. J. Pike (Launceston).

Section of Public Health.

Rational Method of Sewage Disposal.
Dr. T. M. Kendall (Sydney).

Diminution of Waterborne Diseases in Campaigns.
Dr. W. L'Estrange Eames (Newcastle, N.S.W.).

Dr. Morgan Martin (Sydney) and Dr. Ham (Brisbane) spoke on the paper, which they warmly commended. Dr. McDouall and the President warmly complimented Dr. Eames on his paper.

Public Health Act of New Zealand.
Dr. Jas. Mason (New Zealand).

Section of Anatomy.

A Case of Sarcoma of Tongue, with Microscopic Sections.
Dr. Officer (Melbourne).

The Nomenclature of the Muscles of the Foot.
Dr. W. Kent Hughes (Melbourne).

The Medical Congress Entertained by the U.S.S. Coy. of N.Z.

At 2.30 p.m. the Union Company's steamer *Oonah* left the Argyle-street pier with about six hundred excursionists on board for a trip down D'Entrecasteaux Channel. The weather at the outset was somewhat unpropitious, but as the afternoon wore on the sky became clearer, and the outing proved highly enjoyable. Visitors expressed freely their admiration of the beautiful scenery, and were loud in their praises of the liberal and lavish hospitality of the Company.

Cancer Discussion.

During the evening a discussion on Cancer took place in the Town Hall, which was very well attended.

The President (Hon. Dr. Butler) presided.

Prof. H. B. Allen (Melbourne) delivered an introductory address on Cancer, together with elaborate statistics as to the prevalence of the disease in Australasia.

Dr. J. C. Verco (Adelaide) read a paper dealing with Cancer in South Australia.

The meeting then adjourned till Friday evening.

THIRD DAY—WEDNESDAY, FEBRUARY 19, 1902.

At 10 a.m., in the reception-room of the Town Hall, Dr. L. E. Barnett (Dunedin, New Zealand), President of the Section of Surgery, delivered his Presidential Address. There was a large attendance of members.

At the conclusion of the address, Dr. Butler, President of the Congress, moved a vote of thanks to Dr. Barnett, which was carried by acclamation.

The following papers were read :—

Section of Medicine.

Epidemic Cerebro-Spinal Meningitis.
Dr. Jarvie Hood.

Discussion followed, Drs. Hudson, Officer, Sydney Jamieson, the President, Drs. Hayward, Verco, Camac Wilkinson, Woodward, Nihill, and others taking part.

The Serum Diagnosis of Disease, with Special Reference to the Reaction in Typhoid Fever.
Dr. Sydney Jamieson (Sydney).

In the discussion that took place Drs. Camac Wilkinson, Mason, and Howard took part.

Section of Surgery.

The treatment of the Appendix in Cases of Appendicitis with Abscess.
Dr. Wm. Moore (Melbourne).

Discussion followed, in which Prof. Watson, Drs. Hamilton, Russell, Syme, Hinder, and Barnett took part.

Some Observations in Relation to Nephrectomy.
Dr. J. B. Nash (Wallsend, N.S.W.).

Drs. Hinder and Moore discussed the paper.

Section of Eye, Ear, and Throat.

Discussion took place on Specific Affections of the Eye.

Eye Specimens.
Dr. Clendinnen.

Section of Midwifery and Gynæcology.

On the Treatment of Chronic Pelvic Suppuration.
Dr. G. Rothwell Adam (Melbourne).

Causation of Ectopic Pregnancy.
Dr. G. Horne.

Section of Public Health.

The Defects of the Victorian Asylum and their Remedies.
Dr. A. S. Joske (Melbourne).

A discussion took place, in which Drs. Lovegrove, Steell, and others took part. The paper was generally approved.

Some Notes of a Case of Molluscum Fibrosum, with Dementia.

Section of Public Health.

The Defects of the Victorian Asylums, and their Remedies.
Dr. A. S. Joske (Melbourne).

A discussion took place, in which Drs. Lovegrove, Steel, and others took part. The paper was generally approved.

Molluscum Fibrosum, with Dementia, Some Notes of a Case of.
Dr. A. S. Joske (Melbourne).

A Milk Epidemic of Typhoid, illustrating the Duration of Infectivity.
Dr. Jas. Jamieson (Melbourne).

Six Months' Daily Examination of the Melbourne Water-supply.
Dr. Thos. Cherry (Melbourne).

In the discussion that followed, Drs. Ham, McDouall, and Jas. Jamieson took part.

An Examination of the Melbourne Milk-supply for the Tubercle Bacillus.
Dr. Thos. Cherry (Melbourne).

Garden Party.

In the afternoon Senator and Mrs. Macfarlane entertained the members of Congress, their wives, and friends, together with a large number of residents, at a garden party in their extensive grounds at Newlands, Augusta Road, Hobart. The outing was a very pleasant one, and passed off with *éclat*.

Congress Dinner.

The President of the Congress (Hon. Dr. Butler, M.L.C.) gave a dinner at the Tasmanian Club to past Presidents of Congress and present Presidents of Sections, Local Secretaries, and Government representatives from the various States. After a sumptuous repast had been partaken of, the toast of the President and Executive was drunk and enthusiastically honoured.

FOURTH DAY—THURSDAY, FEBRUARY 20, 1902.

At 10 a.m., in the reception-room at the Town Hall, Dr. Thomas Cherry, of Melbourne, President of the Section of Public Health, delivered his Presidential Address before about 120 members of Congress.

At the conclusion of the address, on the motion of Dr. Butler, President of Congress, a vote of thanks to Dr. Cherry was carried by acclamation.

The following papers were then read and discussed in the various Sections :—

Section of Medicine.

A Case of Skin Disease.
Dr. Hardy (Hobart).

Dr. F. A. Bennett and Dr. Herman Lawrence spoke on the case.

Röntgen Rays in the Treatment of some Skin Diseases.
Dr. McMurray (Sydney).

Dr. Herman Lawrence spoke on the subject.

Skin Markings as an Aid in the Diagnosis, Prognosis, and Treatment of certain Skin Diseases.
Dr. Herman Lawrence (Melbourne).

Dr. J. C. Verco spoke on the subject.

Discussion took place on Dr. Camac Wilkinson's paper on Tuberculin as a Remedy in Pulmonary Tuberculosis.

Dr. Wilkinson first gave a brief *résumé* of his paper, and Drs. Gault, Officer, Syd. Jones, and Mills spoke.

Section of Surgery.

A Case of Repeatedly Recurrent Scirrus of the Breast, treated by Oophorectomy and Thyroid Feeding, and subsequently by Exposure to the X-rays.
Drs. C. E. Todd (Adelaide) and J. B. Gunson (Adelaide).

The Congenital Factor in Hernia.
Hamilton Russell, F.R.C.S.E., &c. (Melbourne).

Six Cases of Congenital Dislocation of the Hip treated by the Lorenz Method of Reduction under Chloroform, and subsequent Fixation of Limb in a Fully Abducted Position.
Dr. W. A. Wood (Melbourne).

Section of Eye, Ear, and Throat.

Discussion took place on the Treatment of Middle Ear Suppuration other than the Radical or Mastoid Operation.

Dr. Arthur opened the discussion, and he was followed by Drs. Kirkland, Webster, Kent Hughes, Hankin, Barrett, Hogg, Anderson, and the President.

Section of Midwifery.

Some Interesting Gynæcological Cases.
Dr. J. A. G. Hamilton (Adelaide).

On a Case of Symphysiotomy.
Dr. E. A. Mackay (Melbourne).

An Analysis of 700 Consecutive Confinements in Private Practice.
Dr. H. Osburn Cowen (Eaglehawk, Vic.).

Section of Public Health.

Uniform Action with Regard to Quarantine.

Dr. Jas. Mason opened the discussion on this subject, contending that the question to be considered was, "How to secure the greatest safety with the least possible interference with trade."

Dr. Ham (Queensland) said he would be glad to fall in with a scheme of medical inspection as against quarantine, if it could be made effective and properly carried out.

Dr. Lovegrove (Perth) could not suggest any better method of isolation than at present prevailed, although he was in accord with the English system.

Dr. Crouch (Tasmania) favoured a system of isolation in preference to a costly system of quarantine.

After Drs. Hayward (Adelaide), Kendall (Sydney), and Mr. A. Mault (Tasmania) had spoken, Dr. Cherry moved the following resolution, which was agreed to :—"That, in the opinion of this Congress, vaccination should be uniformly enforced throughout the States, with a view to the early alteration of existing quarantine regulations, and the Federal Parliament be requested to initiate the requisite legislation to give effect to this resolution."

Mr. Mault suggested that the Committee should request the health authorities of all the States to formulate their views upon the question of adopting the Venice Convention.

Location of Sanatoria for Tuberculosis Patients.

Dr. Macansh (Melbourne) opened the discussion, and moved, "That in view of the infectious and contagious character of the tuberculous diseases, this Congress is of opinion that sanatoria for consumptive patients should be established at distances from all towns and villages, with at least an area of 200 acres."

On the suggestion of Dr. Lovegrove, the motion was amended to read, "That the sanatoria should be Government institutions, and be as far as possible of a temporary character."

The motion, in its amended form, was agreed to.

The Diminution of Waterborne Diseases in Campaigns.

Dr. Ham moved, "That, in the opinion of this Section, in consequence of the prevalence of waterborne disease in campaigns, (*a*) instruction in hygiene, including the sterilisation of drinking-water, should form part of the field-training of soldiers; (*b*) as far as practicable, the drinking-water supplied to the soldiers should be sterilised before issue."

The motion was agreed to.

The Spirit of Hygeia in Australasia.
Dr. B. Burnett Ham (Brisbane).

Discussion on this paper was postponed till following day.

Garden Party at Government House.

In the afternoon His Excellency the Governor and Lady Havelock gave a garden party at Government House. Unfortunately, showers of rain militated somewhat against the attendance, which, however, was highly representative. The function was very enjoyable, and the Military Band enlivened the proceedings with spirited music.

X-ray Developments.

In the evening there was a large attendance at the Town Hall, when the proceedings were open to the public.

On Recent Developments in X-rays Apparatus, and in the use of the Rays.
Dr. W. R. Fox (Melbourne).

The Röntgen Rays, with Special Reference to Renal Radiography.
Dr. L. Herschell Harris (Sydney).

Dr. F. J. Clendinnen (Melbourne) gave an exhibition of Röntgen Ray work.

Dr. Jno. Thompson (Brisbane) exhibited numerous lantern slides of microphotographs; also a series of non-pathogenic organisms.

The Premier and Mrs. Lewis "at Home."

The Premier (Hon. N. E. Lewis, C.M.G.) and Mrs. Lewis were "At Home" at the Tasmanian Museum, when about 600 ladies and gentlemen were received. The Premier and Mrs. Lewis received their guests at the entrance, and warmly shook each visitor by the hand. A string orchestra played choice selections of music during the evening, and there was a great abundance and variety of refreshments. The function was in every way successful, and will be remembered as a prominent one in connection with the Sixth Session of the Medical Congress.

FIFTH DAY—FRIDAY, FEBRUARY 21, 1902.

At 10 a.m., in the reception-room at the Town Hall, Dr. Ralph Worrall, of Sydney, President of the Section of Midwifery and Gynæcology, delivered his Presidential Address, "On the Progress of Gynæcology since the first Interstate Medical Congress."

On the motion of Dr. Butler (President of the Congress), a hearty vote of thanks was accorded to Dr. Worrall.

The following papers were then read and discussed in the various Sections :—

The Aboriginal Medicine of Tasmania.
Dr. G. H. Hogg (Launceston).

A Plea for the Sanatorium Treatment of Consumption.
Dr. A. H. Gault (Adelaide).

A discussion followed, in which Drs. Camac Wilkinson, Verco, Hoets, and Jarvie Hood took part.

The Necessity for Education in Tropical Medicine in Australia.
Dr. F. Goldsmith (Port Darwin).

The Committee then brought up their report on the proposal to form a School of Tropical Medicine in Australia, which was adopted, as amended, and sent on for the consideration of Congress at the general meeting on Saturday, February 22.

This closed the business of the Section

Dr. Verco moved a hearty vote of thanks to the President and Secretary, which was carried by acclamation.

Section of Surgery.

The use of Double Thomas Splint for Disease in the Hip-joint.
Dr. E. Alan Maokay (Melbourne).
Scarification and Pressure-pads in the Treatment of certain Chronic Skin Diseases.
Dr. H. F. Lawrence.
Keloid (Alibert) under Treatment by his own Method.
Dr. H. F. Lawrence.
Case of Sarcoma in an Infant Six Weeks Old, with Microscopic Sections.
Dr. D. M. Officer.
Methods and Management of Circumcision.
Dr. A. S. Joske.
Ulcer of the Urinary Bladder.
Dr. H. C. Hinder.

Section of Eye, Ear, and Throat.

A Factor in the Diagnosis of Hereditary Specific Interstitial Keratitis.
Dr. Symons (Adelaide).
Rare Cases of Eye Disease.
Dr. G. H. Hogg (Launceston).

Nasal Stenosis due to Deflections of the Septum.
Dr. T. K. Hamilton (Adelaide).

The Examination of Railway Employees in Vision, Colour, Sense, and Hearing.
Dr. W. McMurray (Sydney).

Bifocal Lenses.
Dr. T. K. Hamilton (Adelaide).

Section of Midwifery.

Discussion took place on Dr. Mackay's paper on Symphysiotomy.
Discussion was held on Dr. Cowen's paper on 700 Consecutive Confinements.

Notes on Puerperal Sapræmia and Septicæmia.
Dr. F. A. Nyulasy (Melbourne).

Section of Public Health.

A discussion took place on Dr. Ham's paper on his suggested organisation of a Federal Department of Public Health, and the establishment of a Sanitary Institute of Australia.

Drs. Kendall, McDouall, Thomson, Lovegrove, Macansh, and Ham spoke on the subjects.

Dr. Macansh moved, "That, in the opinion of the Congress, steps should be taken by the States of the Commonwealth and New Zealand to unify the Public Health Acts throughout Australasia."

Dr. Thomson seconded, and the motion was carried.

Dr. Ham moved, "That, for the purpose of collecting and imparting information upon all matters connected with the subject of public health, a national society be formed, to be styled 'The Sanitary Institute of Australasia.'"

Dr. Kendall seconded, and the motion was agreed to.

A further discussion ensued as to insanitary closets, &c., at State schools, and that the elements of hygiene should be part of the State school curriculum.

Dr. Mason said that in New Zealand State school children were taught the principles of hygiene, and a textbook had been specially prepared for Maori children, in their native language.

On the motion of Dr. Thomson, seconded by Dr. McDouall, it was resolved, "That steps should be taken by the Departments of Public Education and other public departments throughout Australasia to make and keep the water-supplies, water-closets, urinals, and other sanitary conveniences of all public buildings, including floor-space and ventilation, in such a condition as to be an object-lesson to the public. That the elements of hygiene, somewhat after the lines adopted in New Zealand, should form part of the State school curriculum."

Dr. Ham moved, "That the term 'pestis minor' should not apply to plague cases." Plague was plague, and the term was not desirable.

Dr. Thomson seconded.—Carried.

Pseudo-Tuberculosis in Sheep.
Dr. Cherry (Melbourne).

The Colon Bacillus in Relation to Water-supply.
Dr. Cherry (Melbourne).

Some Notes on the Epidemic of Plague in Sydney, from a Public Health Standpoint.
Dr. W. S. Armstrong (Sydney).
Read by Dr. H. C. McDouall.

School of Tropical Medicine.
On the motion of Dr. Ham, seconded by Dr. Goldsmith, it was resolved to forward a resolution to Congress next day in favour of a School of Tropical Medicine being established on a federal basis, and located at Brisbane.

The proceedings of the Section were then closed, with a hearty vote of thanks to Dr. Cherry, President of the Section, and to Dr. W. W. Giblin, Secretary.

Mayor's Garden Party.

His Worship the Mayor (Ald. G. Kerr) gave a garden party at the Salmon Ponds in the afternoon, which proved most enjoyable. At 1·20 p.m. a special train left Hobart, conveying upwards of six hundred guests to the above-mentioned fête. His Worship and Mrs. Kerr received the guests at the railway station, and from the firing of the time gun crowds of visitors wended their way to the starting point. Train accommodation had been provided for six hundred passengers, and whilst not unduly crowded, every carriage was comfortably filled.

On arriving at the Salmon Ponds it was at once apparent that the hospitality of the Mayor and Mayoress had been displayed with the very best results. Three large marquees had been erected—one containing strawberries and cream, fruit, fruit salads, and ice creams; another tea, coffee, sandwiches, and various cakes and sweets; whilst in the third all kinds of non-intoxicating beverages were obtainable. The whole of the refreshments were of the best, and in bountiful supply, and a notable feature was the abundance of waiters. After the good things provided had been enjoyed, the visitors had an opportunity of inspecting the hatcheries, and of seeing the fish fed—the size of some of the speckled beauties winning the admiration of all.

The company was thoroughly representative. In addition to the visitors, Church, Cabinet, Parliament, and Municipal Council were represented, many prominent citizens also being present. The fête was thoroughly enjoyable in every way, and His Worship and Mrs. Kerr won for themselves an enviable reputation as host and hostess, and their garden fêtes will not soon be forgotten. They left nothing undone to secure the comfort and pleasure of their guests, and succeeded admirably. The Hobart Station was reached on the return journey at 6.50, and beyond one slight shower, the day was fine and agreeably cool, the scenery on the homeward trip again being highly appreciated.

Discussion on Cancer.

In the evening, in the presence of His Excellency the Governor (Sir A. E. Havelock), the discussion on Cancer was resumed. There was a good attendance.

The following papers were read :—

Etiology.
W. Camac Wilkinson, M.D., M.R.C.P., Lond.

Cancer, the Influence of Injury, Irritation, and preceding Inflammation on its production.
Sydney Jamieson, M.B., M.Ch., M.R.C.S., Eng.

General Results of Radical Operation.
Fred D. Bird, M.B., M.S., Melb., M.R.C.S., Eng.

Desirability of Removing Chain of Glands near its Growth.
C. E. Todd, M.D., Brux., M.R.C.S., Eng.

Causes Alleged for the Increases of Cancer, examined by reference to Statistics of New South Wales since 1856.
T. A. Coghlan, Government Statistician, Sydney.

Some Aspects of Cancer.
Wm. Stenhouse, M.D.

Cancer Records from the Principal Hospitals in Victoria.
A. W. Finch-Noyes, F.R.C.S., Eng.

Proposed Australasian Medical Association.

By consent, Dr. McCall moved—"That, in the opinion of this Congress, the time has arrived when it will be in the best interests of the medical profession to establish an Australasian Medical Association." He said that such an association should be formed, retaining affiliation with the British Medical Association as a final Court of Appeal. It had generally been admitted that there had been one case remitted to London where the British Medical Association did not act in a manner that was best. An Australian Association would have been better able to judge the case. The meetings of such an association, if formed, would take the place of these Congress meetings; they would have their own journal, which would voice the desire of the whole Australian profession, and would be distributed within a reasonable time after publication. Such an association would wield a great influence towards having uniform legislation with respect to the profession in the States. He condemned the practice of persons of wealth combining to sweat the profession by means of benefit societies. That and other abuses would be met by having their own association.

Dr. G. A. Syme (Melbourne) seconded the discussion *pro forma*.

Dr. Ralph Worrall suggested that the motion be withdrawn.

Prof. Allen moved the adjournment of the debate till the following day, which was agreed to.

The proceedings then terminated.

SIXTH DAY—SATURDAY, FEBRUARY 22, 1902.

At 11 a.m. the adjourned general meeting of Congress was held in the reception room at the Town Hall.

The chair was occupied by the President (Dr. G. H. Butler, M.L.C.), and he was supported by the General Secretary (Dr. Gregory Sprott) and the Treasurer (Dr. J. E. Wolfhagen).

Proposed Australasian Medical Association.

Discussion was resumed on Dr. McCall's motion—"That in the opinion of this Congress the time has arrived when it will be in the best interests of the medical profession to establish an Australasian Medical Association."

Dr. Ralph Worrall (Sydney) moved as an amendment—"That the name of the Congress shall in future be the 'Australasian Medical Congress,' and that each State, including the colony of New Zealand, shall have a representative of the British Medical Association, the same to be hon. secretary of the branch in each State." He claimed that in that way they would have less friction between the Australasian Congress and the Central Association in London. Such representatives would be in closer touch with the profession in Australasia. At present it was not so; they seldom heard of their representative. He did not believe there ever was a time when so many hostile forces surrounded the profession in these States as at present. (Applause.) Therefore, their only hope lay in union. In New South Wales they had complete union, whilst in Victoria they had the least union. (Applause.) In Queensland, two years ago, there was no union at all, mainly because there were two societies, the Queensland Medical Society, which had as members the majority of the profession, together with a large amount of property, and there was the local branch of the British Medical Association. The Queensland Medical Association gave up their property to the local branch of the British Medical Association, and joined it *en masse*. The consequence was that the profession in Queensland was now better organised than ever. (Applause.) Victoria was the one weak State as to organisation in their ranks in Australasia, and it was due, firstly, to there being two medical societies in in Australasia, and it was due, firstly, to there being two medical societies in that State, instead of one good, firm organisation. Then they had a Victorian medical journal, almost exclusively taken by the Victorian medical men; whereas all the other States were well represented by the *Australasian Medical Gazette*, admirably conducted, the only weakness conncted with it being that it required some support from the profession in Victoria. They should support it, and give up their own journal. How much easier it would be for the Victorians to join the organisation existing throughout the other States, as one united body, than for the other States to give up their own organisation, formed with infinite trouble. in order to join the Victorian organisation! (Hear, hear.) One speaker had referred in terms of praise to the Australian Natives' Association, but they looked upon the Australian Natives' Association as the greatest enemy of the profession. (Cheers.) In the first place, it was not a legitimate medical benefit society. (Applause.) Legitimate friendly societies were formed by men mainly of the industrial classes joining together when in health for mutual support when ill; but with the Australian Natives' Association its medical benefits were a secondary matter altogether—(Hear, hear)—existing for the purpose of taking into its ranks men of all classes and persuasions, and diminishing the practice available for the legitimate profession. (Applause.) The Australian Natives' Association was also an illegitimate force in politics; it was an organisation that sought to control the politics of the country for the benefit of a section of the population. (Applause.) America had not become the great nation she is by dividing into sections the peoples of various European nationalities who came to her shores, and making a distinction in favour of any particular section of the settled population, such as the Australian Natives' Association strove to do. (Applause.) The Australian Natives' Association sought to obtain undue privileges and advantages for itself, and he maintained that it was a mischievous force in the community. (Warm applause.) It was an organisation which aimed at substituting intrigue and chicanery for true merit and sterling work. (Cheers.) It was a power behind Ministers, like "Tammany Hall" in New York, where the Mayor was not the power; it was the head of the "Tammany Hall" organisation. (Hear, hear.) The Australian Natives' Association was poking its nose into everything, and seeking to speak for the community in general and in every move that took place, and he held that every member of the profession who countenanced the position of medical officer to that Society helped to enslave the profession. (Loud cheers.) For those reasons he moved the amendment, and trusted that a united Australasian organisation of the profession would be formed, instead of the present position, which tended to disintegrate the profession, proving an unhealthy rivalry with the British Medical Association. (Cheers.)

Dr. HANKINS (Sydney) seconded. As the representative of the British Medical Association branch in New South Wales, he could say that they were there a very united body. They were now more united than they had ever been before. With regard to the Australian Natives' Association, he might say that at its very inception in New South Wales he took the opportunity of interviewing the General Secretary of it, to ascertain whether they fixed any wage limit, or whether any member of it would be open to receive medical benefits, and got the answer that the Australian Natives' Association could not entertain the wage limit for one moment. He then at once called a meeting of his Council, when it was decided that any member who took office in the Australian Natives' Association would be ostracised. This had the effect of hampering the Australian Natives' Association's position, till they at last approached the Council, and expressed their willingness to accept a £200 limit, because they were not able, under any circumstances, to get medical men. (Cheers.) There was not think they got more than two in the whole colony. (Cheers.) There was to be a meeting of the British Medical Association to decide whether they should accept the Australian Natives' Association on any terms, and he sincerely hoped the decision of the British Medical Association branch in New South Wales would be dead against it—(Cheers)—for he felt that if they entered into relations with them the Australian Natives' Association would have their heels upon the necks of members of the profession, and have them in their power. (Applause.) There was no reason why the Australian Natives' Association should seek to establish medical benefits under the Friendly Societies' system. If their members wanted such benefits, they could go into the clubs. (Cheers.) There was no reason why the profession should give in to them at all. It was much better not to have any contract arrangements with them in any shape or form. (Applause.) It seemed at present, in Victoria, to be almost hopeless to bring about a better state of things in the interests of the profession, the Australian Natives 'Association having got such a strong footing there that some of the medical men were unable to freely speak their minds, openly, in the matter. The new Association proposed in Dr. McCall's motion would be regarded in New South Wales as very undesirable. (Applause.) No doubt federal unity, and having business relations in common, with power to govern themselves, would be advantageous, and the other day representation was made to the British Medical Association stipulating for autonomy, and no doubt it would be granted. It would be unwise to talk of forming any new organisation unless that request was refused. He thought they would all agree that what was wanted was a combination of the different societies. (Applause.)

Professor H. B. ALLEN (Melbourne) pointed out that the Medical Society of Victoria was by far the most important in that State. There the British Medical Association had not had the free and easy development that it had had in other States. Recent events had so evolved that the British Medical Association was now comparatively feeble in Victoria, while the other was a strong and healthy society. It would be a policy of doubtful wisdom to put pressure upon the profession in Victoria to alter its society arrangements. One fact would show the strength of that argument. Over and over again the Medical Society had made attempts to bring about an amalgamation with the local branch of the British Medical Association, but the attempt had always been defeated by the branch. It appeared that two or three members of the Medical Society had made one or two injudicious remarks. If this Congress now said that it was to be represented by the branch, not by the Medical Society, it would do grievous harm. Let them take the first part of the resolution altering the title of the Congress, and the President of the next Congress be asked to make inquiries and arrangements for the State business of the Congress. This, if found satisfactory, could be affirmed or changed by the next Congress.

Dr. W. MACANSH (Brighton, Victoria) said he stood there as the representative of the British Medical Association. Under careful managing and nursing it had gone on the increase, and it was the first time he was aware that there had been any actual proposal at all for union of the two societies under the British Medical Association. The subject of amalgamation had been discussed in the Council of the Victorian Branch of the British Medical Association, and it was quite possible for the two Societies to come to some terms.

Dr. E. HINCHCLIFFE (Bendigo, Victoria) said he was President of the Medical Society of Victoria in 1891, when amalgamation was proposed. There were then three hundred members of the Medical Society, and twenty members of the British Medical Association, and the terms offered by the branch of the British Medical Association were such that the Medical Society could not see its way to accept them, and by a unanimous vote they were declined. It was

felt that amalgamation would destroy the work of the Medical Society of Victoria. With respect to the lodge system, they went very far in that direction at Bendigo. Bankers, lawyers, parsons, mine managers, belonged to lodges.

The PRESIDENT hoped that the differences of the Victorian Societies would not be discussed at the Congress.

Dr. R. WORRALL (Sydney) suggested that the resolution might be amended by excepting Victoria and Tasmania, and making the local secretaries elsewhere the representatives of the Congress.

Dr. J. C. VERCO (Adelaide) moved as a further amendment—"That the name of the Congress be altered from 'The Intercolonial Medical Congress of Australasia' to 'The Australasian Medical Congress.'" He said it was not desirable for them to discuss the policy of the Australian Natives' Association, or the relations of the two Medical Societies in Victoria. The proposition, too, would not apply to Tasmania. Then there was the question of the local secretaries. It was questionable that the Secretary of the British Medical Society could represent the Congress. He might not be a desirable man. The Congress only met every three years, and the society secretaries were elected annually; so that the representatives of the Congress might be changed three times in the three years, and perhaps just before the Congress sat. He thought the matter ought to be left in the hands of the Executive of the Congress in the State in which it was held.

Dr. W. T. HAYWARD (Adelaide) seconded the amendment, which was put and carried.

THE ARMY MEDICAL DEPARTMENT.

Professor H. B. ALLEN (Melbourne), on behalf of Dr. Sydney Jones, of Sydney, who was indisposed, brought up the following report of the Committee on the salary of the Director-General of the Army Medical Department of the Commonwealth :—

"That the Intercolonial Medical Congress of Australasia now assembled desires to represent to the Honourable the Minister of Defence the great importance of the organisation, on federal lines, of the Army Medical Department of the Commonwealth. The head of that Department must undertake very great responsibility, and the Congress gladly learns that Colonel Williams, C.B., who has rendered such excellent service, both in Australia and South Africa, has been named as the Chief Administrator. But the Congress entertains a strong opinion that the salary proposed is quite inadequate, and should be raised so substantially that the Director-General of the Army Medical Service of the Commonwealth may devote himself, without fear of financial embarrassment, to the duties of his high office; and that at all times the Commonwealth service may obtain the guidance and oversight of the most able and experienced officer available. The Congress is convinced that any failure in properly establishing the position of the Director-General will entail risk to the efficiency of the entire Federal Medical Service."

The report was adopted unanimously.

The reports of the various Sections were then brought up.

SECTION OF MEDICINE.

Dr. A. H. CLARKE (Secretary of this Section), on behalf of the President, submitted the following recommendations as having been adopted by this Section :—

School of Tropical Medicine.

"The Committee consider it desirable that a School of Tropical Medicine and Research should be established for the scientific and systematic investigation of tropical diseases in Australia, and to this end they recommend the following :—

"1. That Brisbane would be the most suitable place to carry out such investigations.

"2. That the proposed School should be established on lines similar to those of the School for Tropical Medicine in London.

"3. That the Rt. Hon. the Premier of the Commonwealth, and the Premiers of the various States, should be officially approached by the Executive of this Congress for grants to enable such an institution to proceed with its work, and that the Rt. Hon. the Secretary of State for the Colonies, and Dr. Patrick Manson, the head of the School of Tropical Medicine in London, be communicated with on the subject.

"4. The Section recommends the Congress to appoint Dr. Goldsmith as its representative in England."

The report was adopted.

Section of Public Health.

Dr. Thomas Cherry (Melbourne), President of the Section, brought up the following resolutions, passed by the Public Health Section :—

Vaccination.

"That vaccination should be uniformly enforced in all the States, with the view to an early alteration of the existing quarantine arrangements. That the Federal and State Parliaments be requested to institute the necessary legislation to give effect to this resolution."—Agreed to.

Sanatoria for Consumptives.

"That in view of the infectious and contagious character of tuberculous diseases this Congress is of opinion that sanatoria for consumptive patients should be established at distances from all towns and villages, with at least an area of two hundred acres. That the sanatoria should be Government institutions. That the buildings should be, as far as possible, of a temporary character. That a copy of these resolutions be sent to the various health authorities."—Negatived.

Training of Soldiers.

"(*a*) That in the opinion of this Section, in consequence of the prevalence of waterborne diseases in campaigns, instruction in hygiene, including the sterilisation of drinking-water, should form part of the field training of the soldiers; (*b*) as far as practicable, the drinking water supplied to the soldiers should be sterilised before issue."—Agreed to.

School of Tropical Medicine.

"It is desirable that a School of Tropical Medicine should be established for the scientific and systematic investigation of tropical diseases in Australia."—Agreed to.

Unification of Public Health Acts.

"That in the opinion of this Congress steps should be taken by the States of the Commonwealth and New Zealand to unify the Public Health Acts throughout Australasia."—Agreed to.

Sanitary Institute.

"That, for the purpose of collecting and imparting information upon all matters connected with the subject of public health, a National Society be formed, to be styled 'The Sanitary Institute of Australasia.'"—Negatived.

Sanitary Regulations.

"(*a*) That steps should be taken by the Department of Public Education, and other Public Departments, throughout Australasia, to make and keep the water-supplies, the water-closets, urinals, and other sanitary conveniences, including floor space and ventilation of all public buildings, in such condition as to be object-lessons to the public; (*b*) that the elements of hygiene, somewhat after the lines adopted in New Zealand, should be part of the State school curriculum."—Negatived.

Application of a Term.

"That the term 'pestis minor' should not be applied to non-plague cases."—Agreed to.

Section of Eye, Ear, and Throat.

Dr. T. P. Kirkland (Sydney) brought up the following resolution from the Eye, Ear, and Throat Section :—

"That the attention of the Colonial Governments be called again to the resolutions passed by the Intercolonial Medical Congress, held in Dunedin in 1896, on the subject of the standard of vision in sailors and railway men, and that the urgency of their adoption should be again emphasised, with the recommendation that a uniform standard for all the colonies be fixed, not lower than the highest standard at present demanded in any of the colonies for both form and colour."

Standards for Men employed in Railway Service.

Class A.—Cleaners, firemen, drivers, train examiners, greasers, porters, guards, shunters, signalmen—

Vision $\frac{6}{6}$ and $\frac{6}{12}$, or $\frac{6}{9}$ and $\frac{6}{9}$
Hearing $\frac{1}{5}$ in each ear.

Class B.—Repairers, labourers, fencers, gatemen, stationmasters, clerks (connected with running)—

Vision $\frac{6}{6}$ and $\frac{6}{8}$, or $\frac{6}{9}$ and $\frac{6}{12}$
Hearing $\frac{1}{5}$ and $\frac{1}{10}$

Class C.—Clerks not connected with running—

Vision $\frac{6}{6}$, with or without glasses.

Colour Sense.—The colour sense of all railway employees must be perfect.

Standards for Candidates for Service in Railways.

The eyes and ears of all candidates for Railway service will be thoroughly examined. The refraction of each eye will be worked out, and departures from normal will be allowed in some grades to the extent shown below. Any marked diminution in fields of vision will disqualify. There must be no evidence of progressive disease of eyes or ears, latent or otherwise.

The colour sense of all persons appointed to Railway service in any grade must be perfect. Any departure from normal will disqualify.

Vision Standards.

Class A.—Cleaners, shunters, porters, traffic lads, clerks, and operators—

Vision.—Normal $\frac{6}{6}$ in each eye.

Refraction.—Normal (emmetropia) except latent hypermetropia up to ·75D will not disqualify. In hypermetropic astigmatism sum of correcting glasses must not exceed 1·00D, of which only ·50D astigmatism will be allowed

Class B.—Repairers, labourers, telegraph-linemen, and all trades and apprentices—

Vision —Normal ($\frac{6}{6}$) in each eye. $\frac{6}{9}$ in each eye will not disqualify, provided it is not accompanied by latent hypermetropia or evidence of progressive disease.

Refraction.—Normal (emmetropia) except latent hypermetropia up to 1·25D will not disqualify. In hypermetropic astigmatism sum of correcting glasses not to exceed 1·25D, of which not more than ·75D astigmatism will be allowed.

Class C.—Engineering students and draughtsmen.

Vision.—Normal ($\frac{6}{6}$), with or without glasses.

Refraction.—Myopia beyond 3D will disqualify. If myopic astigmatism be present sum of correcting glasses not to exceed 3D.

Hearing Standards.

Class A.—Cleaners, shunters, porters, traffic lads, clerks, and operators. Hearing at least $\frac{3}{4}$ normal.

Class B.—Repairers, labourers, telegraph-linemen, students, draughtsmen, and all trades connected in any way with the running and apprentices. Hearing at least $\frac{1}{2}$ normal.

Class C.—All trades not connected with the running. Hearing at least $\frac{1}{5}$ normal.

The resolution was adopted.

Next Session of Congress.

Dr. Kelsall (Perth), on behalf of the West Australian branch of the British Medical Association, invited the Congress to hold its next session at Perth. He moved to that effect.

Dr. Lovegrove seconded the motion.

Drs. Kent Hughes and McKay contended that Perth was too far away, under present travelling conditions.

After further discussion, Dr. Kelsall withdrew his motion, expressing the earnest hope that Perth would be visited at the eighth session of Congress.

Dr. C. E. Todd (Adelaide) then, on behalf of the South Australian medical profession, extended a hearty invitation to members to hold the next Congress at Adelaide. (Applause.)

Dr. J. A. G. Hamilton seconded the motion, and suggested that Congress should meet in 1904.

Dr. Kent Hughes, to test the matter, moved that the seventh session of Congress be held in 1904.

This was negatived, and it was then agreed to hold the next session at Adelaide in 1905.

Election of President.

Professor Allen moved—"That Professor E. C. Stirling, C.M.G., F.R.S., M.D., Cantab., F.R.C.S., Eng., be President of next Congress." (Cheers.) They all knew his learning, his courage, and also his work, and they knew the indebtedness not only of the profession in South Australia but in all the States to the labours of Professor Stirling. (Cheers.)

The motion was carried amidst prolonged applause.

Votes of Thanks.

Professor Allen said it was his privilege to move—"That a hearty vote of thanks be accorded by Congress to His Excellency the Governor and Lady Havelock for their kindness to members of the Congress."—The motion was carried with cheers.

Dr. J. C. Verco (Adelaide) moved—"That the thanks of Congress be accorded to Rev. R. Stephen and Dr. Scott, D.D., for conducting special services to members."—Carried.

Dr. Jno. Thompson (Brisbane) moved—"That special votes of thanks be accorded the following ladies and gentlemen for their kindness, courtesy, and liberal hospitality displayed to members during their visit :—The Hon. the Premier and Mrs. Lewis—(Applause)—His Worship the Mayor and Mrs. Kerr—(Applause)—Senator and Mrs. Macfarlane, the directors of the Union Steamship Company, President and members of the Central Board of Health, the Tasmanian, Hobart, and Athenæum Clubs, Newlands and Sandy Bay Golf Clubs, and Hobart Bowling Club." (Applause.) He said the fêtes, receptions, and trips had been lavish as they were enjoyable, and the hospitality and scenes witnessed, especially the trip to the Salmon Ponds, would never be forgotten. (Prolonged applause.)

Dr. J. Mason (New Zealand) moved—"That hearty votes of thanks be accorded to His Worship the Mayor and Aldermen, the President, Committee, and members of the Hobart Chamber of Commerce, the Trustees of the Tasmanian Museum and Art Gallery, and the Council of the Royal Society for the use of rooms, and to the Trustees of the Botanical Gardens for the use of plants."—Carried by acclamation.

Dr. Lovegrove (West Australia) moved—"That the hearty thanks of Congress be accorded to the Government of Tasmania for printing, &c., to the Minister of Railways and General Manager of Tasmanian Railways, to the Railway Commissioners of Australia and New Zealand, and to the shipping companies for the concessions granted to members."—Carried by acclamation.

Dr. W. T. Hayward (Adelaide) moved—"That a special vote of thanks be accorded to the Press for the very full and accurate reports they have given to the proceedings of Congress."—Carried with applause.

Professor Allen moved—"That a special vote of thanks be accorded to the General Secretary, Dr. Gregory Sprott—(cheers)—for his untiring efforts on behalf of Congress; to the Treasurer, Dr. J. E. Wolfhagen; to the Secretaries of Sections, and to the local State Secretaries." They had all recognised the work of Dr. Sprott—(Cheers)—who for months past had devoted himself in an untiring way in making the arrangements for Congress, which had proved so eminently successful. During the Session all the provisions for their work had been made in a most satisfactory manner—(Applause)—his unfailing kindness and courtesy to members and his energy and patience in making arrangements to make their stay in Hobart pleasant in every way had been appreciated as they were marked. (Applause.)

The motion was carried with enthusiasm, members standing and giving three ringing cheers.

Professor Watson said he had sincere pleasure in moving hearty thanks to their President, Dr. Butler—(Applause)—for the able manner in which he had presided over their meetings; to the whole of the profession in Tasmania, and to the President and Mrs. Butler for their hospitality and general all-round goodness. (Laughter and applause.) Members had come, they had seen, and they had been conquered—by kindness and hospitality. (Cheers.)

The motion was carried amidst hearty cheers.

Dr. Butler, who was received with loud applause, said after what had fallen from Professor Watson he felt gratified, not alone for himself, but for all Tasmania. He was flattered by the response they had given to the motion, and the appreciation of the work done by the people of Hobart and the profession of Tasmania. (Cheers.) It would be absurd for him to say that their work had been little, because, when divided amongst so few, comparatively speaking (for Tasmania was not one of the largest States), the work had been hard—(Applause)—but they were quite repaid by knowing that the visitors had been pleased and satisfied. (Cheers.)

Dr. Sprott, who was received with cheers, said he hoped they would take his speech as read. (Laughter.) The profession and people were equally delighted to have the Congress in Hobart, and more so to know that they had enjoyed themselves. (Cheers.) So far as the pleasure went, it was easy to please when all had made up their minds to be satisfied. For the Congress, success did not depend on any individual, but on the whole of the profession in Tasmania. Their President and Treasurer—(Applause)—worked hard, and they had the result. (Cheers.)

Official Representation.

The General Secretary (Dr. Sprott) read a letter from Dr. F. Tidswell, of the New South Wales Health Department, regretting that, owing to the increased number in the cases of plague in Sydney, the nomination of Dr. W. G. Armstrong as official representative of New South Wales would have to be withdrawn.

Bacteriological Exhibit.

During the sitting of Congress a bacteriogolical exhibit was on view, kindly sent by Dr. F. Tidswell, of the New South Wales Health Department. The specimens were illustrative of the various forms of Pathogenic and Non-Pathogenic Bacilli. The exhibit attracted much attention, and its general get-up was favourably commented on.

Mayor's Fishing Excursion.

The fishing excursion organised by the Mayor (Alderman Kerr) for members of Congress, on Saturday afternoon, resulted in those who availed themselves of it getting grand sport, all returning to town delighted. Messrs. O'May's steamer was chartered for the purpose, and the party included about sixteen medical men, together with a few other invited guests. There was plenty of fishing tackle provided, whilst the commissariat department was put in charge of Mr. C. D. Haywood. The boat, at 2·30 p.m., first steamed over to the Bellerive side, where some fishing-nets were taken on board, and then proceeded to the inner waters of South Arm, off Chipman's. It was a beautifully sunny afternoon, with the water very calm, and the visitors enjoyed the scenery in such favourable weather almost as much as the sport. After about half an hour's fishing here a move was made to a point off Calvert's. The anchor having been lowered, and the lines again cast all around the deck, it was soon found that a bank of flathead had been struck. For the next couple of hours everybody on board had rare sport. Soon the deck was thickly strewn with wriggling fish, the Mayor catching the largest flathead of all. There were nearly five hundred catches, two fish being occasionally hooked at a time. The largest individual catch was thirty-one flathead.

During the steaming across the river back to Hobart in the moonlight (the visitors having about an hour previously much admired a glorious sunset over Mount Wellington), Dr. Morgan Martin, addressing the Mayor, said:—On behalf of the members of Congress who were of the party, he wished to thank him most sincerely for his hospitality, both on the previous day and on this afternoon. It was long since any of them had had such an enjoyable afternoon's fishing, and that, too, in such pleasant weather, amid such glorious surroundings. (Cheers.) They had enjoyed the sport immensely. They would never forget the kindness and hospitality which had been extended to them in Hobart. (Cheers.)

Trip to the Quarantine Station, Barnes Bay.

On Saturday afternoon a large number of members of the Congress paid a visit of inspection in the s.s. *Huon* to the Quarantine Station, where they were escorted over the grounds and buildings by the members of the Central Board of Health. The trip was a most pleasant one. A number of ladies accompanied the visiting party, and under Mr. C. Haywood's purveyorship a nice luncheon was served, and also afternoon tea. Dr. W. T. Hayward, the South Australian Government representative at the Medical Congress, proposed the health of the President of the Central Board, and took occasion to thank him, on behalf of brother members of the profession, for the most pleasurable excursion, and for

the opportunity given them to obtain useful information concerning quarantine matters. Incidentally he spoke in high praise of the station arrangements. Replying, the Hon. G. T. Collins, President of the Central Board of Health, expressed his great satisfaction at meeting so many members of the profession, and more especially at receiving, through Dr. Hayward, assurance of their hearty approval. Public appreciation of official duties and responsibilities was generally an admixture of kicks and halfpence. In the present instance only the pleasant element prevailed. The toast was musically honoured, the well-charged glasses were emptied, and brief ceremony ended.

The return trip seemed to end all too soon.

At the Bowling Green.

Hobart v. Doctors.

On Saturday afternoon a bowling match was played on the Hobart Green between a team chosen from the club and a team of visiting medical men. The Hobart men were :—Messrs. G. S. Seabrook, 1; H. Drake, 2; S. P. Crisp, 3; R. Snowden (captain), 4. And the doctors were :—Drs. Willis (Malvern, Melbourne), 1; Rosenfeld (Port Melbourne), 2; Adams (Victoria), 3; Harold (Adelaide), captain, 4. The game was 25 heads, and the Hobart team won, making 27 points against the visitors' 25. The players and spectators were entertained at afternoon tea by Mrs. Snowden, Mrs. Crisp, and Miss Reynolds.

Trip to the North-west Coast.

The magnificent scenery along the North-West Coast of Tasmania induced the Executive Committee to arrange for a special trip around that portion of the State, extending over three days. Owing to having prior engagements, many medical gentlemen could not avail themselves of the splendid outing afforded; but, despite that fact, a fair number went. The train left at a convenient hour in the morning, and the General Secretary had made arrangements along the route to have the comfort of the travellers attended to. At Launceston the party were met by Dr. G. H. Hogg and other medical men, and entertained during the afternoon at the Cataract Gorge. At Devonport a short stay was made, where visitors were hospitably received by a committee of the residents; also at Ulverstone Dr. and Mrs. McCall received and entertained them. Burnie was reached in good time, and next day various centres round and about that flourishing district were visited. The trip was an educational and interesting one, and proved all what it was expected to be, the scenery, climate, and everything else being ahead of the most sanguine expectations of the visitors. On the return journey many left the train at Launceston to catch the steamer for the mainland, the remainder coming on to Hobart, which was reached on Wednesday evening. The General Manager of Railways (Mr. C. Hudson) had made the most ample arrangements for the comfort and convenience of the travellers, all of which were heartily appreciated.

CANCER.

INTRODUCTORY ADDRESS

BY

H. B. Allen, M.D.,

Professor of Anatomy and Pathology in the University of Melbourne, and Pathologist to the Melbourne Hospital.

Popular literature on this subject has suffered severely at the hands of men of fads and extremes. The tomato has been pilloried, as though its restricted vogue as an article of diet could explain the almost world-wide prevalence of cancer. The free eating of meat has been execrated, though Scotland, with its oatmeal, suffers more than Australia with its beef and mutton. Estimates are freely made that cancer is, in very truth, twice or four times more prevalent than it was fifty years ago, culminating in Roswell Park's well-known prophecy that, if the relative death rates are maintained, "we shall find that ten years from now, viz., in 1909, there will be more deaths in New York State from cancer than from consumption, small-pox, and typhoid fever combined."

Such alarmist statements are not new. About 1840 much attention was given to the subject. The imperfect records then available indicated that between the years 1728 and 1838 the ratio of cancer deaths to total mortality in London had risen from two per thousand to over six per thousand. About the same time, a Veronese surgeon drew attention to an enormous increase of cancer in that city during the preceding eighty years, anticipating some modern extremists by confining the increase largely to women, and in them to the uterus, females being said to suffer seven times more than males, and the uterine rates to have risen no less than twenty-fold.

When I was requested to open this discussion, and to make the necessary preparation for it, I felt that my first duty would be to procure as complete information as possible concerning the prevalence of cancer in Australasia. The statistics already distributed will permit me to confine myself to a brief summary of the facts elicited on that side of the subject. For the rest, time will not permit more than a limited and partial survey of this vast subject, in which observations of all degrees of accuracy and inaccuracy, and theories of most contradictory character, are confusedly tangled together. Permit me therefore to select a few leading questions for the hasty treatment alone possible.

Is Cancer a Parasitic Disease?

Many facts encourage the belief that cancer is a parasitic disease. The primary local manifestation, its infiltrating nature, the tendency to dissemination throughout the body, and the ultimate cachexia, all bear some analogy to the phenomena of tubercle and other processes due to microbic invasion. Cancer, or some disease closely resembling it, has been successfully inoculated in many cases from one laboratory animal to another; instances are sufficiently numerous, though not so well attested, of transfer from man to lower animals; and definite though guarded statements are made of

successful inoculation from man to man. Repeatedly after operations for cancer, the disease has recurred in an obscure corner of a scar, or in the track of a trocar used in exploratory tapping, in such fashion as to convince the surgeon that he had unintentionally induced a fresh implantation. The so-called parasites of cancer have been brought prominently before English readers by the work of Ruffer, Plimmer, and others. Sanfelice, Plimmer, Gaylord and others have removed the investigation from the domain of histology into that of experimental research. *Sanfelice*, of Sardinia, obtained from the skin of a lemon a yeast, which he inoculated into dogs without producing tumours; but from the site of inoculations and from the nearest lymph glands he recovered the yeast in a more virulent form. Ultimately a female dog, inoculated in the breast, developed after several months a tumour, which increased to half the size of an egg. The centre of the tumour was just like breast tissue, but the margins resembled the early stages of carcinoma. The lymph glands of the groin were enlarged, and showed epithelial structures like those in the edge of the tumour. But the original yeasts could not be recovered from the tumour in the breast, nor from the lymph glands, nor could they be found in microscopic sections. *Plimmer*, of St. Mary's Hospital, London, has found a yeast in actively growing cancer which, when inoculated into the peritoneum of guinea pigs, produces *endothelial* growths in the peritoneum, liver, spleen, lungs, &c., *the animals dying in from thirteen to twenty days*. *Gaylord*, of Buffalo, U.S.A., the Director of the special Cancer Laboratory established in that city, inoculated cancer juice into the jugular veins of guinea pigs, and, like previous experimenters, he obtained in some cases tiny growths in the lungs resembling carcinoma. But another of his observations is much more important. If cancer juice is inoculated into the peritoneal cavity of guinea pigs, no tumours are formed, but the animals die after an average term of 57 days. With continued inoculation from one guinea pig to another, the virulence increases till death occurs in 29 days. Gaylord also finds the parasite lying free in the juice of all cancers, whether carcinomata or sarcomata, and in the peritoneal fluid of his inoculated animals, but states that it is not a yeast, but a protozoon, like those recently described in vaccinia, its smaller forms resembling microscopic particles of fat, but not staining with osmic acid, and not soluble in hot ether. Moreover when cancer juice is suspended in sterile water, and kept for three days as a drop preparation on the warm stage, the parasites increase in size and in number, put out pseudopodia, and pass into sporocysts. *Bosc* of Montpelier finds that structures resembling the epithelial growths of carcinoma and the nests of epithelioma are produced by similar protozoan parasites in small-pox, cow-pox, and sheep-pox. *Vlaieff* claims to have obtained yeasts from malignant tumours, which induced abdominal cancer when injected into guinea pigs. With these yeasts he immunised geese, and with the serum of the geese he made rats immune. Many cases of carcinoma in man have been treated with his serum. Such is, briefly and in part, the argument in favour of the parasitic theory of carcinoma—a theory singularly attractive, because it seems to promise results in prevention and cure similar to those obtained in diphtheria and other microbic diseases.

There are, however, reasons of great weight against the parasitic theory. Children are sometimes born with malignant tumours already developed, though the parents are apparently in perfect health. Cancer is pre-eminently a disease of declining life, occurring more and more frequently from middle life into advanced age, and in this respect unlike all known parasitic diseases. In its development there are many diverse histologic types; and when these types disseminate, they breed true, spindle-celled or melanotic sarcoma or the various forms of carcinoma producing secondary growths of like structure. The primary growths themselves are often very

unlike the results of parasitic infection. For example, a columnar carcinoma of the rectum may show an exaggerated system of tubular gland formation, extending in regular pattern through the *muscularis mucosæ,* and perhaps even through the main muscle coat, before it tends to spread in looser irregular fashion. Allowing for the phenomena produced by coccidia in the rabbit's liver, or by the eggs of Bilharzia in the human bladder, we find no parasitic formation in any way resembling this. When the complicated sarcomata of the kidney produce secondary growths in the lungs, both the embryonic connective tissue element and the epithelial tubes and cylinders are reproduced. The peculiar gland-like epitheliomata of the cervix penis may induce similar gland-like secondary growths in the inguinal lymphatic glands. Papillary cystic tumours of the breast may induce similar complicated growths in the axillary glands. The frequent alveolar structure of disseminated melanotic sarcoma recalls the curious alveolar formations found under pigmented moles. In fact, the general law holds good that the disseminated growths of cancer bear the traces of the seat of the primary growth in a manner and to a degree never manifested in parasitic processes. The reason is simple. In the dissemination of tumours, a cell or group of cells is conveyed by blood or lymph to a new site, and grows there by its own multiplication into a secondary tumour. In tubercle, on the contrary, the parasite itself is disseminated, and multiplies in a new site, there producing irritative lesions, the cells of which are not descended from those of the primary focus. In other words, the secondary growths of cancer are implantations of cells from the original growth, as simple as the skin-grafting of a wound, or the experimental implantation of fœtal cartilage in the anterior chamber of the eye. The inoculations of cancer into animals, already referred to, are also implantations, and are not comparable with the phenomena induced by the bacilli of tubercle or the micrococci of suppuration. The growths produced by such inoculations of cancer, and, it must be remembered, produced only in rare and exceptional cases, have not, so far as known, the permanence of true cancer, or its power of causing secondary growths elsewhere. The production of inflammatory granuloma has often been confounded with the genesis of cancer. Moreover, the so-called parasites of cancer, though easily seen, are of dubious import. *Pianese,* who invented mode after mode of staining them, commenced his investigations certainly with no bias against their parasitic character; but, as his methods varied and multiplied, his faith vanished, and the appearances lost for him all significance. "All the forms that have as yet been described as parasites are easily explained as special cell-alterations." *(Pianese, trans. by Cullen.)* The results of *Sanfelice* have not gained general acceptance. The corpuscles resembling fat, which *Gaylord* describes in cancer juice, are easily seen, and may be watched for days on the stage of an incubated microscope, increasing in size and number; but I have not been able to see any amœboid movement, any formation of sporocysts, or any other clear sign of parasitic nature. They detach themselves from the disintegrating cancer cells, and seem to resemble fat more and more closely as the time of observation is prolonged.

Opinion is still divided concerning the parasitic origin of cancer, but, though I cannot regard the question as settled, my own opinion inclines decidedly to the negative. *Pianese* aptly characterises the theory as "to a certain point a brilliant and justifiable hypothesis."

The Intrinsic Theory.

The whole body is descended from a single original cell, and each part of the body inherits its qualities by continued descent from specialised offspring of that single cell. In each part there is no anarchical mob of cells, but a federal society, with due relations, restraints and provisions. Vessels, connective tissues and epithelial coverings are maintained in due relations

to one another. Tissue elements are constantly perishing, and new elements are being produced. The reparative power is potentially in excess, as may be seen in the healing of a wound after loss of substance, or in the regeneration of a lizard's tail. Repair itself is a social organic process, governed by laws similar to those of ordinary tissue life. The true marvel lies in the federal organisation of each portion of the body, maintaining it in due size and due relation of parts, rather than in the occasional aberrations that induce local over-growth or tumour formation. The symmetry of the hands seems so natural that we forget its mystery. Now and then a child is born with one hand or one finger unduly large, or such over-growth may commence in child life, or rarely even in early adult life. Sometimes the vessels are over-developed, forming certain kinds of naevi and other vascular tumours. Sometimes the connective tissues are in excess, as in the tumour-like thickenings and indurations that form on the legs of ill-used horses. Frequently chronic irritation of the skin causes multiplication and down-growth of epithelium, imitating the early stages of carcinoma. But analogies of far closer character may be found. Carcinoma is a confused imitation of the embryonic process of gland formation, while sarcoma resembles the act of repair, persisting at some one stage or other, the growth in either case being without obvious purpose, without limit, unfederal, evil. *Brault*, however, rightly asserts that every tumour has its own federal life, divorced from, and often hostile to, the life of the body. The current theories of tumour formation give very little assistance in the study of cancer. *Cohnheim's* theory of persistent embryonic "rests" of connective tissue or epithelium, detached from their usual connections, will scarcely serve to explain the cancers of advanced life. *Ribbert's* theory of detachment of epithelium by activities of connective tissue can seldom apply. In studying the early stages of a cancer of the lip or tongue, we do not find mechanical detachment of epithelium, either developmental or acquired. The columns of cancer cells that invade the deeper tissues are directly continuous with the epithelium of the surface. The specialisation of the malignant elements is biologic and functional, not mechanical. Mere misplacement of epithelium does not in itself induce carcinoma. Epithelial "rests" in the ovary or neck may remain inactive, or form dermoid cysts. Portions of epithelium driven deeply into the fingers by injury may produce implantation cysts. Cancer sometimes originates in such "rests" or implantations, but there is the same difficulty in explaining such an event, as when cancer starts in normally-placed epithelium. In any case, the explanation is not yet forthcoming. The extraordinary results obtained by *Lack*, after simply crushing the ovaries of a healthy guinea pig, and introducing the pulp into the peritoneal cavity, are too recent, too unconfirmed by other observations, to weigh greatly in the balance. Possibly, the final explanation of the origin of cancer will not come till the system of tissue tensions and tissue controls indicated by *Ribbert* is more fully understood.

Cancer a Local Process.

Cancer growth is essentially a local process, due to loss or perversion of the local controls, of the local federal bond. On this fact the surgical treatment of cancer is based, and the confidence of the surgeon is seldom shaken. Yet, now and then, multiple primary cancers occur, just as with innocent growths. Such multiples are more often sarcomata than carcinomata. For examples I can quote, from the Museum of the Melbourne University, multiple myxosarcoma of the leg, multiple melanotic sarcoma of the skin, sarcoma of both breasts, several cases of sarcoma of both ovaries, sarcoma of the stomach and of both ovaries, sarcoma of the os innominatum and of both adrenals, sarcoma of the pancreas, liver, and retroperitoneal glands; also, carcinoma of stomach and pancreas, and hard carcinoma of the vagina with

soft carcinoma of the cervix uteri. Multiple epitheliomata of the head and face are not uncommon. Special mention may be made of primary sarcomata or carcinomata implicating widely a particular system of tissues. The same Museum contains a set of specimens of replacing central sarcoma in the bodies of many vertebræ and the shafts of many ribs, imitating osteomalakia. The sections of rapid epithelioma used in my classes of Pathological Histology were obtained from a patient with a very remarkable history. About 1883 a warty growth, in a man aged 56, was removed from the lower lip near the angle of the mouth, and subsequently a second growth from the front of the chin. In 1887 two other growths, each as large as a small bean, were removed from the cheek and the side of the nose, and two crusted ulcers on the forehead and nose were cauterised. In 1892 two fresh tumours, the size of large plums, were removed from the cheek and from the back of the neck. Before the patient's death in 1893, several growths, as large as oranges, appeared at the back of the head and of the neck, and in the cervical glands. There were indications that the sebaceous glands were largely concerned in the origin of the growths. It is therefore clear that the loss or perversion of control may be multiple, or may even be widely spread in some particular tissue, such as bone or skin.

Classification.

In general, the current classification of cancer into two groups, carcinoma and sarcoma, according as it arises from epithelium or from connective tissue, is satisfactory in practice; and the same may be said of the consequent reference of carcinoma to the epiblast or hypoblast, and of sarcoma to the mesoblast. Difficulties were first found in tumours arising from serous membranes, and therefore mesoblastic, but having the histological structure of carcinoma. For such cases, the group of Endotheliomata was established. But further puzzles arise with organs whose embryological relations are not well defined, such as the kidneys, and these were dealt with in part in a paper by Dr. Cherry and myself at the Congress in Dunedin. Not only may primary sarcoma and primary carcinoma co-exist, but cases are recorded of curious blendings of the two great types of cancer, with secondary growths, some purely sarcomatous, others purely carcinomatous. Certain observers have been led to form a new section of archiblastic tumours, derived from undifferentiated embryological elements, while others would divide endotheliomata into those akin to connective tissue and those akin to epithelial structures. Pathologists probably exaggerate the separation of one layer of the embryo from another, forgetting their common descent from the original fertile cell.

Despite all that has hitherto been done, there is ample room for a great work on the pathology of endothelium, a work that would amply occupy and reveal a master mind.

The border lands between sarcoma and myoma, as exemplified in the ovary, or between sarcoma and myxoma, as seen in the limbs and elsewhere, and other disputed pathological territories, need more careful exploration and delimitation; and certain questions, such as the nature and origin of disseminations of thyroid tissue in bone, which lie close to the essential theory of cancer, demand the most minute scrutiny.

Increased Activity or Lessened Resistance.

In carcinoma, the question naturally arises, whether the epithelial invasion is due to some new power on the part of the epithelium, or some lessened resistance on the part of the connective tissues. The epithelium is always active, sometimes with great intensity, sometimes with quiet persistence. The behaviour of the connective tissue varies. In certain cases scarcely any change occurs, beyond the mechanical results of the epithelial

inroad; but, in others, the connective tissue is as active as the epithelium, playing no passive part, but showing itself an energetic partner in the tumour development, sometimes indeed so as almost to confound carcinoma and sarcoma together. The theory of diminished resistance, however, either fails or requires great modification, when we apply it to pure sarcomata arising far away from epithelium. Plain thinking, apart from the bias of theory, leads us to ascribe cancer formation to a direct increase in the activities of cells, whether of epithelial cells in the case of carcinoma, or of connective tissue cells in the case of sarcoma. This opinion may be held with equal strength by the advocates and the critics of the parasitic theory.

In striking accord with this opinion, carcinoma occurs frequently in tissues in which the processes of nuclear division are habitually active, while it is rare in those in which the nuclei are very stable; and it has also been observed that the process of mitotic division of nuclei is notably exuberant in cancer, the nuclear figures frequently exceeding two, and sometimes taking irregular numbers, such as five, as well as showing in many cases marked asymmetry.

The Increased Activity may be Controlled.

It must not be thought that all hopes for the control of cancer, apart from simple extirpation, are bound up with the establishment of its parasitic origin. Curious cases are on record of spontaneous retrogression of malignant tumours. The occasional withering or even disappearance of carcinomata of the breast after the menopause or the removal of the ovaries, the shrinking of some rodent ulcers under the influence of the Röntgen rays, and the rapid changes in the way of degeneration and absorption induced by Coley's fluid in many sarcomata, especially of the spindle-celled type, prove conclusively that the special growing power of cancer elements can be restrained. It is important to note that, in the three methods mentioned, the good results are limited to definite varieties of malignant growth; but, nevertheless, encouragement is given to seek more sure and general controlling power over the progress of cancer, and to obtain all the side-lights that such observations throw on the vexed questions of its nature and causation.

Dissemination.

There is also urgent need for further study of the phenomena of dissemination, and of the conditions which encourage or forbid the formation of secondary growths. Why, for instance, should colloid cancer of the rectum or rodent ulcer of the neck have such enormous power of local growth, and so little tendency to disseminate? Why should a sarcoma of the testis infect the inguinal glands, while the axillary glands usually go free in sarcoma of the breast? Why are the secondary growths following carcinoma of the breast sometimes limited to the liver, and sometimes to the bones? Why should the secondary growths of sarcoma sometimes avoid the lungs, where they usually develop first? In the Museum of the Melbourne University there are considerable groups of specimens illustrating these questions. One of them deserves special mention. Here, in an adult woman, sarcoma started in the ribs of the left side—not in one, but in several, from the third to the sixth—spreading outwards into the muscles, and inwards into the adherent lung, but without producing any secondary growths in the lungs. Other growths formed in the second, third and fifth ribs of the right side. Before death several small growths developed in the skull, and another in the seventh rib of the left side; but still more strangely, and long antecedent to death, *symmetrical* central sarcoma appeared in the surgical neck of each *os humeri*, completely replacing the bony structure. Any attempt to explain such a case would be beyond the limits of this address, and at present not very fruitful. A very practical question, however, is

afforded, when in one woman a carcinoma of the breast grows to great size without infecting the axillary glands, while in another case these glands are involved in marked degree, while the breast itself has undergone but trifling enlargement. Some better explanation than *accident* is needed for delayed infection in one case, and early infection in the other.

Relation of Innocent to Malignant Tumours.

There is a wide-spread belief that innocent tumours have a marked tendency to become malignant. I am convinced that this tendency is much exaggerated. It is confessedly rare to find an encapsuled fibrous tumour beneath the skin or a myoma of the uterus become sarcomatous. But it may be affirmed with equal decision, that a true encapsuled adenoma or fibroadenoma of the breast has very little tendency to pass into carcinoma. I have not had such a case in my own experience. Undoubtedly the development of carcinoma of the breast is often preceded for months or years by a condition of thickening and induration, perhaps associated with pain and tenderness; but this condition is absolutely distinct from adenoma. Histologists call it chronic inflammation, and rightly so in a large proportion of cases; not infrequently they add that the inflammation appears to be due to syphilis, and again rightly. These conditions may persist indefinitely, but very often they pass into carcinoma, either slowly and gradually, or with a sudden change in the rate of growth. It may be questioned whether such irritative conditions are not sometimes essentially cancerous, being an early and prolonged manifestation of the perverted federal life of the tissues. It is noteworthy that in such breasts the various stages in the evolution of carcinoma may be traced with great thoroughness; and that, though the changes are often very wide-spread through the breast, the process is still more or less focal, and not uniform.

Somewhat similar remarks apply to chronic enlargement of the testis, followed ultimately by active sarcomatous growth, though here the signs of antecedent syphilis are frequently more definite.

Reverting to the original proposition, it is well known that cutaneous warts have little tendency to become epitheliomatous, and, in my opinion, the villous papillomata of the bladder have not much more. In the stomach I have found innocent villous growth and carcinomatous infiltration side by side, but utterly independent of each other. The co-existence of innocent and malignant tumours in different parts of the body is not rare. I may quote from my own experience, columnar carcinoma of the colon and mucocolloid adenoma of the ovary, or again, an immense retroperitoneal sarcoma containing curious radiating endothelial structures, associated with a tiny adenosarcomatous growth in the kidney, and with a large angioma in the liver. A curious case for diagnosis presented sarcoma of one rib, adenoma in one adrenal, and syphilitic infiltration in the muscles of the abdominal wall.

On the other hand, melanotic sarcoma now and then originates in pigmented moles, and epithelioma of the tongue is often preceded by leucopakia or warty condition. I do not affirm that innocent tumours have any exemption from cancer, but merely that too much has been made of their supposed tendency to become cancerous.

Influence of Race, Hereditament, Irritation, &c.

Wild animals appear to be less susceptible to cancer than domestic animals; and, among the latter, pigs seem to enjoy a large degree of exemption. Curious statements are made as to the special liability of grey horses to melanotic sarcoma. Certain tumours in rats and in the external genitals

of dogs are now being used for experimental purposes, but more careful histological and bacteriological examination of these tumours is much to be desired.

The savage races of mankind suffer much less than the civilised. Thus, cancer is rare among the Australian aboriginals, many years often passing without a single case being registered among the blacks remaining in Victoria, though the blacks are not exempt from either external or internal cancer. I am informed that cancer is also rare among the Maoris of New Zealand, a race of vastly higher type. By way of contrast, the Chinese in Victoria suffer severely from cancer. Of 68 whom I examined *post mortem*, 17 were the subjects of malignant tumour, 10 having carcinoma, and 7 sarcoma. The notable feature was the frequency of primary tumours in the liver, six in all, four being carcinomatous, and two sarcomatous. In five of the six cases, the growths were fungating into the peritoneal cavity. Three of the carcinoma cases were vague infiltrations of cirrhotic livers.

Great difficulties beset any attempt to estimate the influence of heredity in cancer. The famous series of cases related by Broca shows how terrible this influence may be, the series extending over seventy years, with fifteen cases, all descended from one woman with cancer of the breast. Sibley found cancer of the uterus in a mother and her five daughters. But in general the power of hereditament is infinitely less. Paget found that one-fourth of 322 cancerous patients were aware of the occurrence of cancer in other members of their families, but that only one in 25 had a parent dead from cancer. Snow, in 1075 cases, found a family history in 15·7 per cent., but in 78 healthy people he obtained a similar history in a rather higher percentage. Mr. Powys, of the Victorian Statist's Office, working from the standpoint of a mathematician, has minutely examined the curves of mortality at the various ages, from phthisis and from cancer in Victoria and in England and Wales. He finds that, in phthisis, the age mortality curve is heterogeneous, and may be resolved into two curves, an early curve, having its maximum in England between 25 and 30, in Victoria between 28 and 33, and a late curve, having its maximum in England between 45 and 50, in Victoria between 55 and 63. Mr. Powys suggests that the early curve probably consists of deaths due to contact with phthisical parents, the so-called hereditary phthisis, while the late curve pertains to phthisis acquired later in life from inhaled sputum, &c. In Victorian males the late curve is so strong that the whole tracing, even without adjustment, is markedly dicrotic. On the contrary, Mr. Powys finds that the age curve of cancer mortality is a homogeneous curve, and cannot be split into separate components, and he infers that the dominant cause of cancer is single, and not composite. These striking observations and inferences have not yet been published, but will doubtless receive the careful consideration which they deserve.

The influence of local irritation in favouring the evolution of cancer is beyond question, and is so fully recognised that brief treatment may suffice, and this rather of a critical nature. The classic cases in illustration are those of chimney-sweeps' cancer; and it is very strange that these are so much more prevalent in England than elsewhere; that the sweeps have no special liability, except in one part of the body; and that coal-miners have a comparative immunity from cancer. The popular belief that chimney-sweeps' cancer died out when sweeps ceased to go up the flues may be referred to as an instance of the crude and careless statements that are so often made. In point of fact, little boys went up the chimneys, and old sweeps developed cancer, and this particular form of disease is as prevalent in London now as in former times.

In the Melbourne University Museum, there is a specimen of ulcer of the hand, of five years' standing, which is passing into epithelioma, and there

is also an epithelioma in the scar of a burn fifty years old. But how seldom is such development seen in chronic ulcers or scars of the skin. If we turn to epithelioma of the lips, we find, from Bruns' clinique that it is thirteen times more common in the lower lip than in the upper, and nearly seven times more common in men than in women; but that, if the upper lip only be considered, cancer is very slightly more frequent in men than in women. Cancer of the tongue, pharynx, œsophagus, and stomach is, as we shall find, much more prevalent in men than in women. It is easy to speak of the effects of excess in alcohol and tobacco, but proof of causal connection is not easily found. In the stomach I have seen multiple scars of ulcers of various dates, without any tendency to cancer growth; and I have seen cancer starting in the stomach close to a chronic ulcer, without in any way implicating the ulcer. The female breast suffers a hundred times more often than the male breast, and statements are glibly made about the results of excessive functional activity; yet the udders of cows are very rarely affected, though cows are not immune from cancer. It is impossible to deny that repeated irritation may of itself induce cancer, but the presumption from the evidence is that, in the vast majority of cases, injury and irritation are merely secondary causes, favouring the growth of cancer when the tendency is already present.

As to general conditions, cancer may develop in the young or the old, the robust or the feeble, the stout or the lean, the nervous or the placid, the idler or the over-worked. In a large proportion of cases, it appears in persons who have enjoyed a most healthy life; and patients with cancer seldom suffer from any severe intercurrent diseases, such as croupous pneumonia. But, on the contrary, I could quote from my own experience cases of cancer developing in patients with phthisis or with tuberculous intestine, or with the scars of old tubercle.

Into questions of geographical distribution, cancer towns, cancer suburbs, cancer houses, time will not permit me to enter, nor have I any new facts to lay before you.

Prevalence of Cancer in Australasia.

The statistical tables, which I now have the honour formally to present to the Congress, have been prepared from data most kindly furnished by the Government Statists, with the gracious permission and countenance of His Majesty's Ministers in the several States. No acknowledgment is too warm for the assistance of the Statists, engrossed as they were in the work of the recent census. The tables speak for themselves, and only a brief and necessarily imperfect summary of facts and inferences can now be attempted.

The number of deaths attributed annually to cancer in Australia has risen in thirty years from 458 to 2165, and in New Zealand in twenty years from 138 to 430, the registered deaths from cancer in Australasia during 1900 including 1407 males and 1188 females. If we take 100 as the standard for Australia thirty years ago, and for New Zealand twenty years ago, the deaths in Australia have increased to 480 for males and 465 for females, and the deaths in New Zealand to 367 for males and 260 for females. Hospital experience reflects this great increase. I have been Pathologist to the Melbourne Hospital for slightly over twenty-five years, and during that time have kept notes of 4459 *post mortem* examinations. During the first five years, 6·8 per cent. of the deaths so recorded were due to cancer; during the second five years, 6·9 per cent.; during the third, 9·1 per cent.; during the fourth, 10·2 per cent.; and during the fifth, 10·4 per cent.

Allowance must be made in the first place for increase of population; and it is then found that the Australasian death-rate from cancer for every 10,000 living has risen in the last thirty years, for persons from 2·75 to 5·72; for males from 2·65 to 5·91; for females from 2·86 to 5·50; or,

if we take 100 as the standard thirty years ago, to 223 for males, to 192 for females. *In this short period, therefore, the recorded Cancer rates per 10,000 living have somewhat more than doubled in males, and somewhat less than doubled in females. The female rate, which was the higher, has become substantially the lower.*

The meaning is not clear till we have studied the age incidence of cancer, and the changes in the age distribution of the people. In 1900 the deaths from cancer were distributed as follow in the various age periods:—

Under 5	5-10	10-15	15-20	20-25	25-35	35-45	45-55	55-65	65-75	75 and upwards.
10	7	5	9	11	92	230	490	754	691	296

or, in proportion to 10,000 living at each age—

Under 5	5-10	10-15	15-20	20-25	25-35	35-45	45-55	55-65	65-75	75 and upwards.
0·10	0·12	0·11	0·22	0·23	1·25	3·99	14·91	32·02	56·04	79·44

so that, *while cancer may occur in certain forms at any age, it is pre-eminently a disease of later life,* increasing more and more in prevalence as age increases beyond the middle term. *In Australasia there has been a striking increase in the number of old people, of persons in the cancer period, both an absolute increase, and an increase in proportion to the whole population.* The details are given in the Comparative Australasian Table 10, and a précis in the Summary Table 21. For example, in 1871, if we exclude New Zealand, but include Western Australia, there were 6392 persons of 75 and upwards in Australasia; whereas, in 1900, if we include New Zealand, but exclude Western Australia, it is estimated that there were 34,241 persons of 75 and upwards. If we consider the proportions which those living at the several age periods bear to the whole population, we find that the relative increase in favour of the elder folk begins with the decade from 55 to 65, and increases into old age; so that from 75 upwards, if we take the proportionate numbers of 1871 as 100, the old men have increased to 187, and the old women to 250; or, roughly speaking, *the old men have nearly doubled in numbers in relation to the whole community, while the old women have far more than doubled. A large part of the increase in cancer is explained in this simple way.*

The study of age incidence gives other valuable information. Not only is the death rate from cancer in persons under 25 very small, but since 1880 it shows no increase, the rates per 10,000 living being 0·11 for 1870-72, 0·18 for 1880-82, 0·19 for 1890-92, and 0·17 for 1900. The rates for children under five have decreased from 0·22 in 1870-72 and in 1880-82 to 0·19 in 1890-92, and 0·17 in 1900. Thus the definite conclusion is reached *that cancer in children and young people is not increasing,* or, in other words, that there is no increase in sarcoma of the bones, the fasciæ, the kidney, the testis, the eye, either in infants or in young people under 25. Males under 25 suffer more than females under 25 in the proportion of 3 : 2.

We may turn aside for a moment to study the history of sarcoma in more advanced life. This is not an easy task. I have brought together the figures relating to the brain, eye, lung, heart, lymph glands (other than the neck), kidney, upper and lower limbs, and the bones, in both sexes, from 25 upwards, together with the ovary in females of like age. The separate figures

for the testis are not available, but would not largely affect the result. Tumours of the parts named may, in my opinion, be taken as fairly representative of sarcoma. The result is, that *sarcoma in males above 25 has slightly decreased since 1870* (from 0·67 to 0·60 per 10,000), although the tumours of old people have come to bulk more largely in the schedule. In females there has been a decided increase, to a rate slightly higher than that of males (from 0·16 to 0·91 with the ovary, from 0·12 to 0·67 without the ovary). But, evidently, there was some fault in the diagnosis of female cases in former time, and even more than with males there has, of late years, been more frequent recognition of sarcoma in old people. The study of Table 13 will show how very erroneous is the common belief that sarcoma is pre-eminently a disease of childhood. It is the only form of malignant tumour affecting young persons; but, in 1900, estimated in the manner just described, the sarcoma rates per 10,000 living in each age period were only 0·06 for males and for females under 25, while the rates for those of 75 and upwards were 3·89 for males and 7·04 for females, and it may be noted that no case of ovarian cancer was recorded at this advanced age.

Reverting to our main argument, we find that *in the age periods from 25 to 35 and from 35 to 45 the cancer rates (including sarcoma) have fluctuated from year to year, though there is no definite increase.* But, with each succeeding decade, as carcinoma becomes more and more dominant over sarcoma, the rates per 10,000 living have decidedly risen, as the following table shows:—

Age.	1870–72.	1900.
45 to 55	10·41	14·82
55 to 65	17·70	32·84
65 to 75	25·80	55·96
75 and upwards	27·14	78·32

or, if we take 100 as the standard in each case for 1870-72, the cancer deaths in 1900 stand as follow:—

45 to 55	142
55 to 65	186
65 to 75	217
75 and upwards	289

The summary result is, that *while recorded cancer shows no definite increase in persons under 45, there is a progressive increase above that age by 42 per cent. between 45 and 55, by 86 per cent. between 55 and 65, the rates being more than doubled between 65 and 75, and nearly trebled from 75 upwards.*

Comparing the sexes, we find that the total female rate was higher than the male in 1870-72 and in 1880-82, but lower than the male in 1890-92 and in 1900. At the present time the female rate is slightly above the male from 25 to 35, and double the male from 35 to 45, though not itself increasing in this decade. It is higher than the male from 45 to 55 in the proportion of 17 : 12, about equal to the male from 55 to 65, slightly less from 65 to 75, and eight per cent. less from 75 upwards.

But some startling figures appear when the male and female statistics of 1870-72 are compared with those of 1900. If we take the rates of 1870-72 as 100 in each age period, the male and female rates for 1900 are as follow:—

Age period.	Male.	Female.
45 to 55	169	114
55 to 65	193	175
65 to 75	221	211
75 and upwards	251	423

so that the male rate has increased much more rapidly than the female between the ages of 45 and 55, and slightly more rapidly in the two following decades; but, *from 75 upwards, while the male rates have been multiplied by 2½, the female rates have been multiplied by 4¼*. If we concentrate our attention on persons of 75 and upwards, we find that *the increase has been steadily progressive*, the rates per 10,000 living at such age being as follow:—

	1870-72	1880-82	1890-92	1900
Males	32	48	52	81
Females	18	35	45	75

Here is the crucial question: Do these figures, and particularly those relating to females, represent a real increase in the prevalence of cancer, or a more regular recourse to medical advice, better diagnosis, and more explicit registration of the cause of death? Undoubtedly, with the material progress of these communities, the aged, and particularly the aged women, have better and more regular medical attendance, and the prejudice against a record of cancer in death certificates is decreasing. Further evidence, however, is afforded by the comparative records of the several States, marked discrepancies in their cancer histories pointing to better diagnosis and more explicit registration as the chief causes of the apparent increase of the disease. It will be noted that in 1870 and in 1880 Tasmania had the highest record for cancer mortality; but in the succeeding decades of years, Tasmania has moved to a far more desirable position. Yet, as a matter of fact, the Tasmanian rates have scarcely altered during the past thirty years, the male rate moving slightly upward, and the female rate fluctuating slightly downward. But the other States have gradually grouped themselves around the Tasmanian rates, the more thickly settled States above, the more thinly settled States below. The increase in recorded cancer rates is much more marked in the thickly settled communities. The rates also fluctuate with the age distribution of the people. The recent influx of a young and middle-aged population into Western Australia has been attended by a decrease in the cancer rate, even more marked among females than among males. The higher records in Victoria than in New South Wales may be due to the closer settlement in the smaller State, with the consequent easier access to medical advice.

Turning again to the Tasmanian records, we find that underneath the apparent monotony considerable changes have occurred, notably an increase of recorded cancer in old persons of both sexes, and in women between 55 and 65, while in many other periods of life the rate has fallen. The figures submitted will repay much more ample study and treatment.

Still further information is available in the details of organ incidence. In Australasia, as elsewhere, the most notable feature is the frequency of cancer in the uterus and female breast, which contribute 23·7 per cent. and 9·6 per cent. respectively to the total cancer mortality in females. Cancers of the tongue, pharynx, larynx, œsophagus, stomach, pancreas, and urinary bladder are more common in males, while the intestine is affected almost equally in the two sexes. The liver suffers somewhat more often in women, doubtless, in the main, through secondary infection from the breast or elsewhere. The face, lip, jaw, and glands of the neck suffer much more in men. On the whole, in Australasia, men suffer slightly more often than women; but, if the generative and mammary systems be excluded, males suffer in great excess, the rates per 10,000 living being, approximately, 5·96 and 3·52.

If we study the apparent changes in prevalence during the past thirty years in the domain of organ incidence, we find that the stomach rate has doubled in both sexes, while the liver rate has trebled in men and nearly

quintupled in women. Cancer of the intestine (not including the rectum) has quintupled in men and increased sevenfold in women, the rectum rate having trebled in women, while in men it has increased tenfold. In men, also, the tongue rate has nearly doubled, the throat rate trebled, the bladder rate nearly quadrupled, and the pancreas rate multiplied sevenfold. These rates of increase seem to bear some proportion to the difficulty of diagnosis. But, on the other hand, *the face rate in males is less* than it was twenty years ago. *The lip rate in males has fallen* from ·068 in 1870-72 to ·047 in 1900, though in females it has increased to one-third of the male rate. Infinitely more important, *the uterus rate shows only a slight increase* (from 1·13 to 1·29 per 10,000 females living), and *the female breast rate, after increasing somewhat, now stands lower than in 1870.*

But the meaning of these changes is not fully apparent till we study the organ and age incidence together. I have selected for special presentation (*a*) cancer of the head, face, nose, and lips in males; (*b*) cancer of the tongue in males; (*c*) cancer of the stomach in males and in females; (*d*) cancer of the liver in males and in females; (*e*) cancer of the breast in females; and (*f*) cancer of the uterus. It will be found that in the head, face, nose, and lip, the only notable increase is in persons of 75 and upwards. In the tongue there is a slight increase from 45 to 55, more decided from 55 to 65, and a slight increase from 65 upwards. In the stomach there is a slight increase from 45 to 55, more decided from 55 to 65, especially in women, and very decided from 65 upwards, especially in women. In the liver the increase is greater than in the stomach, but affects the age periods in much the same way. In the female breast there is a total decrease, but there is an increase by one-third between 55 and 65, and by less than a third from 65 upwards. *In the uterus there is a decrease under* 55, a slight increase from 55 to 65, a more than fourfold increase from 65 to 75, and also from 75 upwards. *The uterine rates, which were peculiar in having an early maximum, have now assumed the usual cancer type, the rates per 10,000 increasing with every decade into old age.*

General Conclusion.

While I am not prepared absolutely to deny that there has been any increase in the prevalence of cancer, I can state positively that malignant tumours in young people show no recent sign of increase; that among the external cancers, which are easily recognised, those of the face and lip in males appear to be less frequent than formerly, while cancer of the breast in women has also decreased; that uterine cancer has only slightly increased, the rates for women under 55 being lower than they were thirty years ago; that the apparent increase of cancer is most marked in old people, and particularly in women of 75 and upwards; and I am strongly of opinion that most of this apparent increase is fictitious, being due partly to changes in the age distribution of the population, and partly to more regular medical examination, better diagnosis, and more explicit registration.

Comparison of Australasian with English Rates.

If we finally compare the Cancer Statistics of Australasia with those of England and Wales, it is found that the Australasian rates are decidedly lower for male and for females, and this both for all ages, and at almost every

period of life except for persons of 75 and upwards. The rates for England and Wales were higher in 1899 than ever before, the general rate being 8·29 per 10,000 living, the male rate 6·72 and the female rate 9·77. When the generative and mammary systems are excluded, the female rate in England and Wales is only slightly less than the male. These proportions between the sexes contrast strongly with those which obtain in Australasia, where the total female rate is less than the male, instead of being nearly half as large again; and where exclusion of the generative and mammary systems brings the ratio of the female rate to the male rate down to, approximately, as 10:17. In England and Wales, as in Australasia, the cancer rates increase from middle life into old age. While the total rates in England and Wales have increased from 4·46 in the period 1871-75 to 8·29 in 1899, the Australasian rates have increased from 2·75 in 1870-72, to 5·72 in 1900, a satisfactory comparison with which this lengthy paper may well conclude.

I N D E X.

SUMMARY AUSTRALASIAN STATISTICS.

COMPARATIVE STATISTICS OF THE AUSTRALASIAN STATES.

Note.—These Tables include Cancer, Carcinoma, Malignant Tumour, Epithelioma, Rodent Ulcer, Malignant Adenoma, and Sarcoma. As far as possible, primary growths only have been included, and secondary growths, as such, have been disregarded.

The Statistics of Population are based on the Census Returns of 1871, 1881, and 1891. For 1900, the Census Returns of 1901 have been used for Total Population in each State or Colony, and, where possible, and notably in New South Wales, for Age Distribution also. In most cases, however, the Age Distribution for 1900 has been carefully computed. In Western Australia there has been so great an increase of population during the last decade, that no reliable computation of Age Distribution for 1900 could be made.

As to Organ-incidence, South Australia could give no particulars, and New Zealand none before 1900. New South Wales was unable to prepare the particular details desired, but furnished special Tables for the whole period from 1856 to 1900. The Summary Tables of Organ-incidence have been made as inclusive as possible.

The most hearty thanks are due to the Statists of Australia and New Zealand for the mass of information prepared during the stress of Census work, and to the various Governments for all the facilities afforded.

Special acknowledgment must be made of the advice and assistance given by Mr. J. J. Fenton (the Victorian Statist), and members of his staff, and of the care and courtesy shown by the Government Printer of Tasmania.

H. B. ALLEN.

29th January, 1902.

(A.)

SUMMARY TABLES FOR AUSTRALASIA.

1. Annual Number of Deaths from Cancer.

	Males.	Females.	Persons.
Average of 1870-71-72 (not including New Zealand)	242	216	458
Average of 1880-81-82	519	450	969
Average of 1890-91-92	1005	821	1826
1900	1407	1188	2595

2. Cancer Deaths per 10,000 living.

	Males.	Females.	Persons.
1870-71-72 (not including New Zealand)	2·65	2·86	2·75
1880-81-82	3·50	3·58	3·54
1890-91-92	4·93	4·64	4·80
1900	5·91	5·50	5·72

3. Cancer Deaths in Percentage of Deaths from All Causes.

	Males.	Females.	Persons.
1870-71-72 (not including New Zealand)	1·74	2·29	1·96
1880-81-82	2·22	2·74	2·43
1890-91-92	3·37	3·88	3·58
1900	4·75	5·59	5·10

4. Population and Deaths from all Causes.

	Population.			Deaths from all Causes, Approximate Annual.		
	Males.	Females	Persons.	Males.	Females.	Persons.
1870-71-72 (not including New Zealand)	912,969	754,320	1.667,289	13,875	9455	23,330
1880-81-82	1,483,007	1,256,895	2,739.902	23,388	16,426	39,814
1890-91-92	2,037,980	1,768,417	3,806,397	29,851	21,153	51,004
1900	2,380,349	2,159,950	4.540,299	29,607	21,234	50,841

5.—NUMBER OF DEATHS FROM CANCER AT EACH AGE.

	Under 5.	5-10.	10-15.	15-20.	20-25.	25-35.	35-45.	45-55.	55-65.	65-75.	75 and upwards.	Age not stated.	TOTAL ALL AGES
MALES.													
Average of 1870-71-72 (not including New Zealand)	$3\frac{2}{3}$	$\frac{2}{3}$	...	$\frac{2}{3}$	2	$14\frac{1}{3}$	41	60	66	$40\frac{1}{3}$	$13\frac{1}{3}$	...	242
Average of 1880-81-82	$4\frac{2}{3}$	$2\frac{1}{3}$	1	3	5	$18\frac{1}{3}$	53	138	146	$102\frac{2}{3}$	43	$2\frac{1}{3}$	$519\frac{1}{3}$
Average of 1890-91-92	$6\frac{2}{3}$	$3\frac{2}{3}$	$1\frac{2}{3}$	$4\frac{1}{3}$	9	$30\frac{1}{3}$	$81\frac{2}{3}$	$215\frac{2}{3}$	332	$238\frac{2}{3}$	81	$\frac{2}{3}$	$1005\frac{1}{3}$
1900	6	5	3	5	7	46	86	239	427	413	170	...	1407
FEMALES.													
Average of 1870-71-72 (not including New Zealand)	$2\frac{1}{3}$	...	...	$\frac{1}{3}$	$\frac{2}{3}$	$18\frac{1}{3}$	$55\frac{1}{3}$	$70\frac{1}{3}$	42	$22\frac{2}{3}$	4	$\frac{1}{3}$	$216\frac{1}{3}$
Average of 1880-81-82	4	$1\frac{1}{3}$	$1\frac{1}{3}$	$2\frac{2}{3}$	4	$33\frac{1}{3}$	$82\frac{1}{3}$	$134\frac{2}{3}$	$107\frac{1}{3}$	$58\frac{2}{3}$	$20\frac{1}{3}$	...	450
Average of 1890-91-92	$3\frac{1}{3}$	$2\frac{1}{3}$	$2\frac{1}{3}$	$1\frac{2}{3}$	$7\frac{2}{3}$	39	$115\frac{1}{3}$	$213\frac{2}{3}$	$234\frac{2}{3}$	$150\frac{1}{3}$	$50\frac{1}{3}$	...	$820\frac{2}{3}$
1900	4	2	2	4	4	46	144	251	327	278	126	...	1188
PERSONS.													
Average of 1870-71-72 (not including New Zealand)	6	$\frac{2}{3}$	...	1	$2\frac{2}{3}$	$32\frac{2}{3}$	$96\frac{1}{3}$	$130\frac{1}{3}$	108	63	$17\frac{1}{3}$	$\frac{1}{3}$	$458\frac{1}{3}$
Average of 1880-81-82	$8\frac{2}{3}$	$3\frac{2}{3}$	$2\frac{1}{3}$	$5\frac{2}{3}$	9	$51\frac{2}{3}$	$135\frac{1}{3}$	$272\frac{2}{3}$	$253\frac{1}{3}$	$161\frac{1}{3}$	$63\frac{1}{3}$	$2\frac{1}{3}$	$969\frac{1}{3}$
Average of 1890-91-92	10	6	4	6	$16\frac{2}{3}$	$69\frac{1}{3}$	197	$429\frac{1}{3}$	$566\frac{2}{3}$	389	$131\frac{1}{3}$	$\frac{2}{3}$	1826
1900	10	7	5	9	11	92	230	490	754	691	296	...	2595

Deaths from Cancer in 1900, Western Australia being excluded.

	Under 5.	5-10.	10-15.	15-20.	20-25.	25-35.	35-45.	45-55.	55-65.	65-75.	75 and upwards.	Age not stated.	TOTAL ALL AGES
Males	5	5	3	5	7	45	81	231	419	405	168	...	1374
Females	4	2	2	4	3	45	139	246	322	277	125	...	1169
Persons	9	7	5	9	10	90	220	477	741	682	293	...	2543

6.—Cancer Mortality per 10,000 Persons Living at each Age.

	Males.				Females.				Persons.			
	1870-71-72. *	1880-81-82.	1890-91-92.	1900. †	1870-71-72. *	1880-81-82.	1890-91-92.	1900. †	1870-71-72. *	1880-81-82.	1890-91-92.	1900. †
Under 5...........	0·27	0·23	0·25	0·19	0·18	0·20	0·13	0·15	0·22	0·22	0·19	0·17
5-10	0·06	0·13	0·15	0·18	...	0·08	0·10	0·07	0·03	0·10	0·13	0·13
10-15	...	0·06	0·08	0·12	...	0·08	0·11	0·08	...	0·07	0·10	0·10
15-20	0·10	0·21	0·23	0·23	0·05	0·19	0·09	0·18	0·07	0·20	0·16	0·20
20-25	0·31	0·36	0·45	0·37	0·10	0·32	0·41	0·15	0·21	034	0·43	0·26
25-35	0·95	0·84	0·84	1·25	1·62	2·02	1·37	1·30	1·24	1·35	1·07	1·28
35-45	2·93	2·86	3·67	2·70	6·60	6·31	7·03	5·88	4·32	4·29	5·10	4·10
45-55	7·56	9·75	12·89	12·77	15·33	15·55	17·61	17·52	10·41	11·94	14·87	14·82
55-65	17·09	20·94	29·44	32·92	18·75	24·81	31·52	32·75	17·70	22·41	30·26	32·84
65-75	25·70	35·80	50·06	56·70	25·98	32·05	46·05	54·92	25·80	34·32	48·43	55·96
75 and upwards	32·30	47·57	51·63	81·06	17·70	34·90	44·85	74·92	27·14	42·59	48·80	78·32
All Ages	2·65	3·50	4·93	6·05	2·86	3·58	4·64	5·59	2·75	3·54	4·80	5·83

* Not including New Zealand, Statistics not being available.

† Not including Western Australia. The age-distribution of population for 1900 is largely computed, and computation is impossible in Western Australia for the last decade.

7.—Persons living at each Age.

	*1871 Census Return.			1881 Census Return.			1891 Census Return.			†1900 Largely computed.		
	Males.	Females	Persons.	Males.	Females.	Persons.	Males.	Females.	Persons.	Males.	Females.	Persons.
Under 5	136,776	132,780	269,556	203,889	198,764	402,653	269,954	262,562	532,516	267,319	260,942	528,261
5–10	119,346	116,828	236,174	179,933	177,014	356,947	240,779	234,821	475,600	276,183	270,256	546,439
10–15	97,154	94,853	192,007	165,621	161,947	327,568	212,313	208,073	420,386	257,658	254,583	512,241
15–20	67,301	69,452	136,753	141,513	142,385	283,898	187,385	186,788	374,173	218,916	220,563	439,479
20–25	64,432	63,636	128,068	139,138	126,913	266.051	199,246	187,335	386,581	190,236	197,871	388,107
25–35	150,403	113,616	264,019	217,122	165,267	382,389	361,844	285,109	646,953	359,973	344,959	704,932
35–45	139,694	83,783	223,477	185,706	130,514	316,220	222,665	164,091	386,756	300,553	236,425	536,978
45–55	79,415	45,937	125,352	142,145	86,701	228,846	167,468	121,329	288,797	180,950	140,954	321,904
55–65	38,626	22,433	61,059	70,054	43,258	113,312	112,918	74,440	187,358	127,285	98,324	225,609
65–75	15,694	8738	24,432	28,807	18,306	47,113	47,708	32,647	80,355	71,428	50,438	121,866
75 and upwards	4128	2264	39 2	9079	5826	14,905	15,700	11,223	26,923	20,725	16,684	37,409
All ages	912,969	754,320	1,667,289	1,483,007	1,256,895	2,739,902	2,037,980	1,768,417	3,806,397	2,271,227	2,091,999	4,363,226

* Excluding New Zealand, no statistics being available.
† Excluding Western Australia, where the age distribution cannot at present be computed.

8.—Cancer Mortality in England and Wales compared with that in Australasia.

(*a*) Cancer Mortality per 10,000 living.

	England and Wales (1899).	Australasia (1900).
Males	6·72	5·91
Females	9·77	5·50
Persons	8·29	5·72

(The English rates being the highest on record.)

(*b*) Age Incidence per 10,000 living.

	Males.		Females.	
	England and Wales.	Australasia.	England and Wales.	Australasia.
Under 5	·31	·19	·25	·17
5-10	·16	·18	·16	·13
10-15	·20	·12	·18	·10
15-20	·31	·23	·27	·20
20-25	·59	·37	·43	·26
25-35	1·12	1·25	1·80	1·28
35-45	4·50	2·70	9·40	4·10
45-55	14·24	12·77	24·48	14·82
55-65	36·89	32·92	45·01	32·84
65-75	58·69	56·70	64·35	55·96
75 and upwards	68·15	81·06	76·30	78·32

(*c*) Increase of Cancer Mortality per 10,000 living.

	England and Wales.		Australasia.
1861-65	3·68	—	—
1871-75	4·46	1870-72	2·75
1881-85	5·48	1880-82	3·54
1891-95	7·12	1890-92	4·80
1899	8·29	1900	5·72

9.—Organ Incidence of Cancer,

9A. Number of Deaths from Cancer in Victoria, Queensland, Western

Males.

	Average of 1870-71-72.	Average of 1880-81-82.	Average of 1890-91-92.	1900. Without New Zealand.	1900. With New Zealand.
Nervous System—					
Brain and Cord	1·3	1·3	2·3	2	3
Special Sense—					
Eye, Orbit	1·3	2	1	1	1
Ear	·3	·3	1	...	1
Respiratory & Circulatory Systems—					
Larynx Trachea	·3	...	4	11	14
Lung, Heart	3·3	3·6	6	6	8
Digestive System—					
Parotid	·6	...	·3	1	2
Mouth	3·6	5·6	8·3	7	8
Tongue	9·6	12·6	29·6	35	49
Pharynx, Throat	3·6	5·6	17·6	22	33
Œsophagus	3	7·6	14·3	24	31
Stomach	42	67	129·6	163	229
Intestine	2·6	6·3	15·6	21	37
Rectum	1	4·6	13·3	21	31
Liver, Gallbladder	14·3	38	67·6	92	117
Pancreas	1	2·3	7·6	18	21
Peritoneum	...	·6	2	4	4
Lymphatic and other Glands—					
Neck	5·6	7·6	18·3	23	38
Axilla and Groin	1	·6	2·3	2	2
Other Lymph Glands	2·3	3·3	5·3	8	8
Spleen, Thyroid	...	·6	·6	1	2
Urinary System—					
Kidney	1	1·6	3·6	10	10
Bladder Urethra	2	3	7	18	23
Prostate	·6	1·3	1·3	5	7
Generative and Mammary System—					
Penis, Testis, Scrotum	4·6	3·3	4	5	7
Breast	·6	·7	·7	1	1
Locomotive System—					
Shoulder, Hip, Arm, Leg	1·3	4·3	5·6	6	11
Spine, Skull, Rib, Sternum	6·3	1·3	1	3	3
Jaw	·6	6	18	27	39
Integumentary System—					
Head and Scalp	...	·3	...	2	2
Face and Nose	6	16·6	20·6	23	32
Lip	3·6	1·6	5·6	6	7
Skin	...	...	·6	2	2
Not Classified—					
Back and Buttock	...	·3	·3	1	2
Thorax	...	·6	...	...	...
Abdomen, Pelvis	5	12	13	22	28
Part not stated	22	35	58·4	56	82
Total	151 3	258·6	487	649	895
Total, excluding Generative and Mammary System	146	254·6	482·3	643	887

FROM 1870 TO 1900.

Australia, and Tasmania, including also New Zealand in 1900 only.

Females.

	Average of 1870-71-72.	Average of 1880-81-82.	Average of 1890-91-92.	1900. Without New Zealand.	1900. With New Zealand.
Nervous System—					
Brain and Cord	·3	1·3	2·6	4	4
Special Sense—					
Eye, Orbit	·6	·6	1·6	...	1
Ear	...	...	...	...	...
Respiratory & Circulatory Systems—					
Larynx, Trachea	...	·3	·6	...	...
Lung, Heart	·6	4·3	7	6	9
Digestive System—					
Parotid	...	...	...	...	...
Mouth	1·6	·3	1·3	1	1
Tongue	·6	2	2	6	6
Pharynx, Throat	·3	3·3	4·6	5	6
Œsophagus	·6	·3	2	2	2
Stomach	17·3	29·3	60	90	115
Intestine	1·6	1·6	8·6	24	37
Rectum	2·3	6·6	6	16	21
Liver, Gallbladder	8	24·3	47·3	88	115
Pancreas	...	·3	1·6	5	7
Peritoneum	...	...	1·6	2	2
Lymphatic and other Glands—					
Neck	·3	2·3	2	1	1
Axilla, Groin	...	...	1·6	1	1
Other Lymph Glands	·3	1	2·3	7	8
Spleen, Thyroid	·3	...	1	...	1
Urinary System—					
Kidney	·3	·3	3·3	4	7
Bladder	1·3	1	2	1	1
Generative and Mammary System—					
Vulva Vagina	·3	...	·6	...	...
Uterus	49·3	64·6	96·3	123	172
Ovary and Broad Ligament	·6	2·6	7·3	8	13
Breast	23·6	36	59·6	52	70
Locomotive System—					
Shoulder, Hip, Arm, Leg	...	1	3·3	9	10
Spine, Skull, Rib, Sternum	...	·3	1·3	2	2
Jaw	·6	·3	1·3	3	3
Integumentary System—					
Head and Scalp	...	·3	..	1	1
Face and Nose	...	3·3	6·3	9	10
Lip	...	·6	2	1	2
Skin	...	...	·3	...	...
Not Classified—					
Back and Buttock	·3	...	...	...	1
Thorax	·6	...	...	...	2
Abdomen, Pelvis	3·6	11·3	15	15	21
Part not stated	15·3	30·3	48·3	56	74
TOTAL	131·6	230·6	401·6	542	726
Total, excluding the Generative and Mammary System	58	127·3	238·3	359	471

9B.—Organ Incidence of Cancer in 1900, in percentage of Total Cancer in Males and Females. (Victoria, New Zealand, Queensland, Western Australia, and Tasmania.)

Males.		Females.	
Organ.	Per cent.	Organ.	Per cent.
Stomach	25·6	Uterus	23·7
Liver	13·1	Stomach	15·8
Tongue	5·5	Liver	15·8
Jaw	4·4	Breast	9·6
Neck	4·2	Intestine	5·1
Intestine	4·1	Rectum	2·9
Pharynx, Throat	3·7	Abdomen, Pelvis	2·9
Face and Nose	3·6	Ovary	1·8
Œsophagus	3·5	Shoulder, Hip, Arm, Leg	1·4
Rectum	3·5	Face and Nose	1·4
Abdomen, Pelvis	3·1	Lungs and Heart	1·2
Bladder	2·6	Lymph Glands, excluding neck	1·2
Pancreas	2·3	Others under 1 per cent	8·0
Larynx, Trachea	1·6	Not stated	10·2
Shoulder, Hip, Arm, Leg	1·2		
Kidney	1·1		
Others under 1 per cent.	7·7		
Not stated	9·2		
Cancer in all parts	100·00	Cancer in all parts	100·00

9c.—Organ Incidence per 10,000 living. Averages of 1870-71-72, 1880-81-82, 1890-91-92 for Victoria, Queensland, Western Australia, and Tasmania, with proportions of 1900 for the foregoing with New Zealand. (Omitting parts with less than one per cent. of total Cancer Mortality.)

Organ	Average of 1870-71-72.	Average of 1880-81-82.	Average of 1890-91-92.	1900.
MALE.				
Stomach	0·77	1·02	1·39	1·54
Liver	0·26	0·58	0·73	0·78
Tongue	0·18	0·19	0·32	0·33
Jaw	0·01	0·09	0·19	0·26
Neck	0·10	0·12	0·20	0·26
Intestine	0·05	0·10	0·17	0·25
Pharynx, Throat	0·07	0·09	0·19	0·22
Face and Nose	0·12	0·25	0·22	0·21
Œsophagus	0·06	0·12	0·15	0·21
Rectum	0·02	0·07	0·14	0·21
Abdomen, Pelvis	0·10	0·18	0·14	0·19
Bladder	0·04	0·05	0·08	0·15
Pancreas	0·02	0·04	0·08	0·14
Larynx, Trachea	0·01	...	0·04	0·09
Shoulder, Arm, Hip, Leg	0·02	0·07	0·06	0·07
Kidney	0·02	0·03	0·04	0·07
Part not stated	0·41	0·53	0·63	0·55
FEMALE.				
Uterus	1·13	1·14	1·20	1·29
Stomach	0·40	0·52	0·75	0·86
Liver	0·18	0·43	0·59	0·86
Breast	0·54	0·64	0·74	0·52
Intestine	0·04	0·03	0·11	0·28
Rectum	0·05	0·12	0·07	0·16
Abdomen, Pelvis	0·08	0·20	0·19	0·16
Ovary	0·02	0·05	0·09	0·10
Shoulder, Arm, Hip, Leg	...	0·02	0·04	0·08
Face and Nose	...	0·06	0·08	0·08
Lungs and Heart	0·02	0·08	0·09	0·07
Lymph Glands, excluding Neck	0·01	0·02	0·05	0·07
Part not stated	0·35	0·54	0·60	0·55

10.—GENERAL CANCER RATES IN MALES AND FEMALES PER 10,000 LIVING, INCLUDING AND EXCLUDING THE GENERATIVE AND MAMMARY SYSTEM.

[For the Colonies specified in (9*a*).]

	Average of 1870-71-72.	Average of 1880-81-82.	Average of 1890-91-92.	1900.	
				Without New Zealand.	With New Zealand.
MALES.					
Including	2·79	3·94	5·23	5·99	6·01
Excluding	2·69	3·88	5·18	5·94	5·96
FEMALES.					
Including	3·02	4·15	5·01	5·58	5·43
Excluding	1·33	2·29	2·97	3·70	3·52

11.—Organ and Age Incidence

(1.) Organ and Age Incidence for average of 1870-71-72, for *Males.*

	Under 25.	25-35.	35-45.	45-55.	55-65.	65-75.	75 and upwards.
Nervous System—							
Brain and Cord	...	...	1	·3	...	...	...
Special Senses—							
Eye and Orbit	...	...	·3	...	·3	·6	...
Ear	...	...	...	...	·3	...	...
Respiratory & Circulatory Systems—							
Larynx Trachea	...	...	·3	...	...	...	...
Lung, Heart	...	·3	1	·3	1·6	...	...
Digestive System—							
Parotid	...	·3	...	·3	...	...	...
Mouth	...	...	1·3	1·6	·3	·3	...
Tongue	·3	...	2·3	3·3	1·6	2	...
Pharynx, Throat	...	·3	·3	·6	·6	1·6	...
Œsophagus	...	·6	·3	·3	1	·6	...
Stomach	...	2·3	6·6	13·3	12·6	5·6	1·3
Intestine	...	...	1	·6	1	...	...
Rectum	...	...	1	...	...	...	...
Liver, Gallbladder	...	1·3	3·3	4·6	3·3	1·3	·3
Pancreas	...	...	·3	·3	·3	...	...
Peritoneum	...	...	...	...	...	...	...
Lymphatic and other Glands—							
Neck	...	·6	2·6	1	·3	1	1
Axilla and Groin	...	...	...	·3	·3	·3	...
Other Lymph Glands	·3	1	·3	...	·3	·3	...
Spleen, Thyroid	...	...	...	...	...	...	...
Urinary System—							
Kidney	...	...	...	·6	...	·3	...
Bladder, Urethra	·3	...	·3	·3	·6	·3	...
Prostate	...	...	...	...	·6	...	...
Generative and Mammary System—							
Penis, Testis, Scrotum	...	·3	·6	·6	1·6	1	·3
Breast	...	...	...	·6	...	...	...
Locomotive System—							
Shoulder, Hip, Arm, Leg	...	...	·3	...	·6	·3	...
Spine, Skull, Rib, Sternum	...	·3	1·3	2·3	1·6	6	...
Jaw	...	...	...	...	...	·6	...
Integumentary System—							
Head and Scalp	...	...	...	...	...	...	...
Face and Nose	...	·3	·6	·3	2	2	·6
Lip	·3	·3	·6	·6	·3	1·3	...
Skin	...	...	...	...	...	...	...
Not Classified—							
Back and Buttock	...	...	...	...	...	...	...
Thorax	...	...	...	...	...	...	...
Abdomen, Pelvis	...	·3	1	1	2·3	·3	...
Part not stated	1·3	·6	4	4·3	6·6	3	2
TOTAL.	2·6	8·6	29·3	40	41·6	23·3	5·6

SHOWING NUMBER OF DEATHS FROM CANCER.

Victoria, Queensland, Western Australia, and Tasmania.

Females.

	Under 25.	25-35.	35-45.	45-55.	55-65.	65-75.	75 and upwards.	Age not stated.
Nervous System—								
Brain and Cord	...	·3	...	...	...	...	...	...
Special Senses—								
Eye, Orbit	·3	...	...	...	...	...	·3	...
Ear	...	...	...	...	...	...	...	...
Respiratory & Circulatory Systems—								
Larynx, Trachea	...	...	...	...	...	...	...	...
Lungs, Heart	...	...	·3	·3	...	...	...	...
Digestive System—								
Parotid	...	...	...	...	...	...	...	...
Mouth	...	...	...	·6	·3	3	·3	...
Tongue	...	...	...	...	·3	·3	...	...
Pharynx, Throat	...	...	...	·3	...	...	...	...
Œsophagus	...	...	...	·6	...	...	...	...
Stomach	·3	2·6	4·3	5	2·6	2·3	...	...
Intestine	...	...	·3	·6	·3	·3	...	...
Rectum	...	...	1	1	·3	...	...	...
Liver, Gallbladder	...	1	1·6	2·3	1·3	1·6	...	...
Pancreas	...	...	...	...	...	...	...	...
Peritoneum	...	...	...	...	...	...	...	...
Lymphatic and other Glands—								
Neck	...	...	...	...	...	·3	...	...
Axilla and Groin	...	...	...	...	...	...	...	...
Other Lymph Glands	...	...	·3	...	...	...	...	...
Spleen, Thyroid	...	...	·3	...	...	...	...	...
Urinary System—								
Kidneys	...	...	·3	...	...	...	...	...
Bladder	...	...	1	...	...	·3	...	...
Generative and Mammary System—								
Vulva, Vagina	...	...	...	...	·3	...	...	...
Uterus	·3	5·6	17·6	16·3	8	1	·3	...
Ovary and Broad Ligament	...	...	·3	·3	...	...	...	...
Breast	...	1·3	7·3	8·3	3·3	2·3	·6	·3
Locomotive System—								
Shoulder, Hip, Arm, Leg	...	...	...	...	...	...	...	...
Spine, Skull, Rib, Sternum	...	...	...	...	...	...	...	...
Jaw	...	...	·3	...	·3	...	...	...
Integumentary System—								
Head and Scalp	...	...	...	...	...	...	...	...
Face and Nose	...	...	...	...	...	...	...	...
Lip	...	...	...	...	...	...	...	...
Skin	...	...	...	...	...	...	...	...
Not Classified—								
Back and Buttock	...	...	...	...	·3	...	...	...
Thorax	...	...	·3	·3	...	...	...	...
Abdomen, Pelvis	·3	·6	...	1·3	·3	1	...	...
Part not stated	·3	·3	3·6	4·6	4	1·6	·6	...
TOTAL	1·6	12	39·3	42·3	22	11·6	2·3	·3

11.—Organ and Age Incidence.

(2.) Organ and Age Incidence for average of 1880-81-82, for *Males.*

	Under 25.	25-35.	35-45.	45-55.	55-65.	65-75.	75 and upwards.	Age not stated.
Nervous System—								
Brain and Cord	...	...	·3	...	1	...	...	...
Special Senses—								
Eye, Orbit	1·3	...	...	...	...	·3	·3	...
Ear	·	...	...	·3	...	...	...	...
Respiratory & Circulatory Systems—								
Larynx, Trachea	..	...	...	...	...	...	...	...
Lungs, Heart	·3	...	·3	1·6	1·3	...	...	...
Digestive System—								
Parotid	...	...	...	...	...	...	...	..
Mouth	·3	...	·6	1·3	1	2	·3	...
Tongue	...	...	1	3·3	3·6	3	1·6	...
Pharynx, Throat	...	·3	·3	2	·3	2	·6	...
Œsophagus	...	·3	1	2·6	2	1·6	...	...
Stomach	·6	·6	4·6	18	26	12·3	4·3	·3
Intestine	·6	·3	·6	3	1·3	...	·3	...
Rectum	...	·3	...	2	1·6	·6	...	...
Liver, Gallbladder	·3	·6	4·6	12	12	6·6	1·6	...
Pancreas	...	...	·6	1	·6	...	...	...
Peritoneum	...	...	...	...	·3	·3	...	...
Lymphatic and other Glands—								
Neck	...	·3	1·6	1·3	3	1	...	·3
Axilla, Groin	...	...	·3	...	·3	...	...	...
Other Lymph Glands	...	·3	·3	·3	·3	1	1	...
Spleen, Thyroid	...	...	·3	...	·3	...	...	...
Urinary System—								
Kidney	·3	...	...	·6	·6	...	...	...
Bladder, Urethra	...	...	·6	1	1	...	·3	...
Prostate	...	...	·3	...	...	·3	·6	...
Generative and Mammary System—								
Penis, Testis, Scrotum	...	·3	...	1·3	·3	1	·3	...
Breast	...	...	·3	...	...	·3	...	...
Locomotive System—								
Shoulder, Hip, Arm, Leg	·3	·3	·3	1·3	1	...	1	...
Spine, Skull, Rib, Sternum	...	...	·3	·3	·6	...	...	...
Jaw	...	·3	1	1	1	1·6	1	...
Integumentary System—								
Head and Scalp	...	...	...	...	...	·3	...	...
Face and Nose	·3	·3	1	2·6	5	5	2·3	...
Lip	·3	...	·3	...	·6	...	·3	...
Skin	...	...	...	...	...	...	...	...
Not Classified—								
Back and Buttock	...	...	...	...	·3	...	...	...
Thorax	...	...	...	·6	...	...	...	...
Abdomen, Pelvis	·3	·3	1·6	4·3	5	·3	...	...
Part not stated	3·6	1·6	3	9	6·6	6·6	4	·3
Total	9	6·6	26	71·3	77·6	46·6	20·3	1

SHOWING NUMBER OF DEATHS FROM CANCER.

Victoria, Queensland, Western Australia, and Tasmania.

Females.

	Under 25.	25-35.	35-45.	45-55.	55-65.	65-75.	75 and upwards.
Nervous System—							
Brain and Cord	·3	·3	...	·3	...	...	·3
Special Senses—							
Eye, Orbit	...	...	...	...	·3	·3	...
Ear	...	...	...	...	...	...	...
Respiratory & Circulatory Systems—							
Larynx, Trachea	...	·3	...	...	...	...	...
Lung, Heart	...	·6	1·3	2·3	...	...	...
Digestive System—							
Parotid	...	...	...	...	...	...	...
Mouth	·3	...	...	...	...	...	...
Tongue	...	...	...	·3	·6	1	...
Pharynx, Throat	·3	·3	...	·3	·3	1·3	·6
Œsophagus	...	...	...	...	·3	...	...
Stomach	...	·6	4·6	7·3	10·3	6	·3
Intestine	...	·3	·3	·6	·3	...	...
Rectum	...	·3	1·6	2·6	1·6	·3	...
Liver, Gallbladder	1·3	1·3	3·3	6·3	8	2·3	1·6
Pancreas	...	...	...	...	...	·3	...
Peritoneum	...	...	...	...	...	...	...
Lymphatic and other Glands—							
Neck	·3	...	...	·3	·6	·6	·3
Axilla and Groin	...	...	...	...	...	...	...
Other Lymph Glands	·3	...	...	·3	·3	...	...
Spleen, Thyroid	...	...	...	...	...	...	...
Urinary System—							
Kidney	·3	...	...	...	...	...	...
Bladder	...	...	·3	·3	·3	...	...
Generative and Mammary System—							
Vulva, Vagina	...	...	...	...	...	...	...
Uterus	·3	5	16·3	20·3	14·3	6·6	1·6
Ovary and Broad Ligament	...	·3	...	1·3	·6	·3	...
Breast	...	2·6	7·3	10	10·3	3·6	2
Locomotive System—							
Shoulder, Hip, Arm, Leg	·3	...	...	...	·3	·3	...
Spine, Skull, Rib, Sternum	...	...	...	·3	...	...	...
Jaw	...	...	...	·3	...	...	...
Integumentary System—							
Head and Scalp	...	...	...	...	·3	...	...
Face and Nose	·3	...	·3	1	...	...	1·6
Lip	...	...	...	...	...	·3	·3
Skin	...	...	...	...	...	...	...
Not Classified—							
Back and Buttock	...	...	...	...	...	...	...
Thorax	...	...	...	...	...	...	...
Abdomen, Pelvis	·6	1	1	3·3	3·3	2	...
Part not stated	1	3·3	3·6	11	6·3	3	2
TOTAL	6	16·6	40·3	69	59	28·6	11

11.—ORGAN AND AGE INCIDENCE,

(3.) Organ and Age Incidence for average of 1890-91-92, for *Males.*

	Under 25.	25-35.	35-45.	45-55.	55-65.	65-75.	75 and upwards.
Nervous System—							
Brain and Cord	·3	·6	...	...	·6	·6	...
Special Senses—							
Eye, Orbit	·3	...	...	·3	·3	...	...
Ear	...	...	...	...	...	1	...
Respiratory & Circulatory Systems—							
Larynx, Trachea	...	...	·6	1	1·3	1	...
Lung, Heart	...	...	1·3	2	1·3	·6	·6
Digestive System—							
Parotid	...	...	...	...	...	...	·3
Mouth	...	·3	·6	1·6	2	3·6	...
Tongue	...	...	1·3	6·6	12·3	5·6	3·6
Pharynx, Throat	...	·6	1·3	4·6	5·3	3·6	2
Œsophagus	...	...	...	3	6·3	4·3	·6
Stomach	·3	1·3	9	25·6	48·6	38·3	6·3
Intestine	...	1	1·3	3·6	5	3	1·6
Rectum	·6	...	1	2·3	3·6	4·3	1·3
Liver, Gallbladder	·3	2·6	5·6	17	22	17	3
Pancreas	...	·3	...	1·3	3·6	2	·3
Peritoneum	...	...	·3	·3	·3	1	...
Lymphatic and other Glands—							
Neck	·3	·3	1·3	3·3	6·3	4·3	2·3
Axilla and Groin	...	...	·3	...	1	1	...
Other Lymph Glands	...	·6	...	1	1·3	1·3	1
Spleen, Thyroid	...	...	...	...	·3	...	...
Urinary System—							
Kidney	·6	...	...	·3	2·3	·3	...
Bladder, Urethra	...	·3	...	1·3	3	1·6	·6
Prostate	·3	...	...	...	·6	...	·3
Generative and Mammary System—							
Penis, Testis, Scrotum	...	·6	1	...	·6	1	·6
Breast	...	...	...	...	·3	·3	...
Locomotive System—							
Shoulder, Hip, Arm, Leg	·6	·6	·3	·6	1·3	1·6	·3
Spine, Skull, Rib, Sternum	...	·3	...	...	·3	...	·3
Jaw	·3	...	1·6	4	5·6	5	1·3
Integumentary System—							
Head and Scalp	...	...	...	...	...	...	...
Face and Nose	...	1·3	·3	2·6	8	4·3	4
Lip	...	...	·3	...	1·6	1·3	2·3
Skin	·3	...	...	...	...	...	·3
Not Classified—							
Back and Buttock	·3	...	...	...	...	...	...
Thorax	...	...	...	...	...	...	...
Abdomen, Pelvis	1·3	·6	1	2	3·6	3·3	1
Part not stated	·3	1·6	5·6	10·3	18·3	14·6	7·3
TOTAL	6·6	13·6	34·6	95·3	168	126·6	42

SHOWING NUMBER OF DEATHS FROM CANCER.

Victoria, Queensland, Western Australia, and Tasmania.

Females.

	Under 25.	25-35.	35-45.	45-55.	55-65	65-75.	75 and upwards.
Nervous System—							
Brain and Cord	...	...	1	...	·6	·6	·3
Special Sense—							
Eye, Orbit	·6	...	...	...	·6	...	·3
Ear	...	...	...	...	...	...	...
Respiratory & Circulatory System—							
Larynx, Trachea	...	...	·3	·3	...	...	...
Lung, Heart	·6	·3	·3	2·6	2	·6	·3
Digestive System—							
Parotid	...	...	...	...	...	...	...
Mouth	...	...	...	·6	·6	...	...
Tongue	...	...	...	·3	1	·3	·3
Pharynx, Throat	...	...	·3	2	1	1	·3
Œsophagus	...	...	·3	·6	...	1	...
Stomach	·3	1	5·3	13	21·6	16·3	2·3
Intestine	...	...	1	3·6	2·6	1	·3
Rectum	...	...	1	1	1·3	2	·6
Liver, Gallbladder	1	3·3	3	12	17·6	9·3	1
Pancreas	...	·6	...	...	·6	·3	...
Peritoneum	...	...	·3	...	·6	·3	·3
Lymphatic and other Glands—							
Neck	...	...	...	·6	1	·3	...
Axilla and Groin	...	·3	·3	·3	·3	...	·3
Other Lymph Glands	...	...	·3	1·3	·3	...	·3
Spleen, Thyroid	...	...	...	1	...	...	...
Urinary System—							
Kidney	·3	·3	...	1	·6	·6	·3
Bladder	...	·3	...	·6	...	1	...
Generative and Mammary System—							
Vulva, Vagina	...	...	...	...	·3	...	·3
Uterus	...	6·3	21	25·6	29·6	12	1·6
Ovary and Broad Ligament	...	1·3	1	4	...	·6	·3
Breast	...	3	7·6	14·6	15·6	13·6	5
Locomotive System—							
Shoulder, Hip, Arm, Leg	...	·3	·6	...	1	·6	·6
Spine, Skull, Rib, Sternum	...	...	...	...	·3	·6	·3
Jaw	...	...	·3	...	...	·6	·3
Integumentary System—							
Head and Scalp	...	...	...	...	...	...	...
Face and Nose	·3	...	·3	1·3	2	1	1·3
Lip	...	·3	·3	...	·6	...	·6
Skin	...	...	...	...	...	...	...
Not Classified—							
Back and Buttock	...	...	...	...	...	...	...
Thorax	...	...	...	...	...	...	...
Abdomen, Pelvis	...	1·3	1·3	4·6	4·6	2·6	·3
Part not stated	1·3	2·3	5·6	11	13	11	4
TOTAL	4·6	21·3	52·3	102·6	120·3	78	22·3

11.—Organ and Age Incidence,

(4.) Organ and Age Incidence in 1900 for Victoria, New

Males.

	Under 25.	25-35.	35-45.	45-55.	55-65.	65-75.	75 and upwards.
Nervous System—							
Brain and Cord	...	1	...	1	1	...	...
Special Senses—							
Eye and Orbit	...	...	...	...	...	...	1
Ear	...	...	...	...	1	...	...
Respiratory & Circulatory System—							
Larynx, Trachea	...	...	1	2	5	5	1
Lung, Heart	1	1	1	1	1	3	...
Digestive System—							
Parotid	1	...	...	...	1	...	...
Mouth	...	...	1	1	5	1	...
Tongue	...	...	5	12	15	14	3
Pharynx, Throat	1	...	2	4	13	11	2
Œsophagus	...	...	3	6	13	6	3
Stomach	2	7	16	43	60	83	18
Intestine	1	...	1	10	12	11	2
Rectum	...	2	...	3	11	12	3
Liver, Gallbladder	2	4	7	19	37	30	18
Pancreas	...	...	3	4	6	6	2
Peritoneum	...	1	...	...	3	...	...
Lymphatic and other Glands—							
Neck	...	...	1	8	11	13	5
Axilla and Groin	...	...	...	...	...	1	1
Other Lymph Glands	...	1	...	2	2	3	...
Spleen, Thyroid	...	...	...	...	1	...	1
Urinary System—							
Kidney	...	1	...	2	1	4	2
Bladder, Urethra	...	...	...	4	5	6	8
Prostate	...	...	...	...	2	4	1
Generative and Mammary System—							
Penis, Testis, Scrotum	...	...	...	...	2	1	4
Breast	...	...	...	...	...	1	...
Locomotive System—							
Shoulder, Hip, Arm, Leg	4	2	...	1	2	1	1
Spine, Skull, Rib, Sternum	...	1	1	1	...	...	...
Jaw	...	1	1	8	12	10	7
Integumentary System—							
Head and Scalp	...	...	...	...	1	1	...
Face and Nose	...	2	2	2	11	4	11
Lip	...	...	...	1	1	4	1
Skin	...	...	...	...	1	...	1
Not Classified—							
Back and Buttock	...	...	...	1	...	...	1
Thorax	...	...	...	...	...	...	...
Abdomen, Pelvis	3	3	3	4	7	7	1
Part not stated	4	4	5	9	21	26	13
TOTAL	19	31	53	149	264	268	111

SHOWING NUMBER OF DEATHS FROM CANCER.

Zealand, Queensland, Western Australia, and Tasmania.

Females.

	Under 25.	25-35.	35-45.	45-55.	55-65.	65-75.	75 and upwards.
Nervous System—							
Brain and Cord	...	...	1	1	1	...	1
Special Senses—							
Eye, Orbit	...	...	...	...	1	...	...
Ear	...	...	...	...	...	...	...
Respiratory & Circulatory System—							
Larynx, Trachea	...	...	...	...	...	...	...
Lungs, Heart	...	...	...	3	3	2	1
Digestive System—							
Parotid	...	...	...	...	...	...	...
Mouth	...	...	...	...	1	...	...
Tongue	...	...	...	...	3	2	1
Pharynx, Throat	...	1	1	2	...	...	2
Œsophagus	...	1	...	...	...	1	...
Stomach	...	3	11	15	34	42	10
Intestine	...	2	7	9	12	5	2
Rectum	1	1	2	5	3	6	3
Liver, Gallbladder	2	1	6	19	41	37	9
Pancreas	...	...	...	1	2	4	...
Peritoneum	...	1	...	...	1	...	...
Lymphatic and other Glands—							
Neck	...	...	...	...	...	1	...
Axilla and Groin	...	...	1	...	...	...	...
Other Lymph Glands	1	...	2	2	1	...	2
Spleen, Thyroid	...	...	...	...	1	...	...
Urinary System—							
Kidney	...	1	1	2	3	...	...
Bladder	...	...	...	1	...	...	...
Generative and Mammary System—							
Vulva, Vagina	...	...	...	...	...	...	...
Uterus	...	12	32	40	46	31	11
Ovary and Broad Ligament	2	1	1	6	1	2	...
Breast	...	1	11	14	19	13	12
Locomotive System—							
Shoulder, Hip, Arm, Leg	1	1	...	...	1	5	2
Spine, Skull, Rib, Sternum	...	...	...	...	...	1	1
Jaw	...	...	...	1	...	1	1
Integumentary System—							
Head and Scalp	...	...	...	...	...	...	1
Face and Nose	...	...	...	3	...	4	3
Lip	...	...	...	...	...	...	2
Skin	...	...	...	...	...	...	...
Not Classified—							
Back and Buttock	...	...	...	...	...	1	...
Thorax	...	...	...	1	...	1	...
Abdomen, Pelvis	...	...	1	5	5	8	2
Part not stated	...	5	10	19	17	16	7
TOTAL	7	31	87	149	196	183	73

12—Population in Age Groups of Victoria, Queensland, West Australia, and Tasmania, in 1871, 1881, and 1891, and of Victoria, New Zealand, Queensland, and Tasmania, in 1900.

	1871.		1881.		1891.		1900.	
	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
Under 25..	277,762	273,579	365,692	360,140	495,813	478,104	725,420	720,947
25-35	89,884	66,019	83,649	69,441	177,877	137,553	221,826	214,962
35-45	92,428	51,896	77,240	59,104	94,644	71,347	183,150	144,527
45-55	49,964	26,282	72,918	44,706	71,954	55,581	107,599	85,514
55-65	21,446	11,939	37,763	21,341	57,292	38,136	83,404	62,538
65-75	8448	4727	14,400	8514	25,079	15,894	45,982	31,707
75 and upwards ...	2250	1259	4408	2771	7641	5057	12,863	9939
	542,182	435,701	656,070	566,017	930,300	801,672	1,380,064	1,270,134
					New Zealand......		405,992	366,727
					Western Australia		109,122	67,591

13.—Approximate Estimate of Sarcoma.

Based on the Statistics of Victoria, Queensland, Western Australia, and Tasmania in 1870–72, 1880–82, 1890–92, and of Victoria, New Zealand, Queensland, and Tasmania in 1900.

Including Malignant Tumours of the Brain, Eye, Lungs, Heart, Lymphatic Glands (except those of the neck), Kidney, Shoulder, Hip, Arm, Leg, Spine, Skull, Ribs, Sternum, together with the Ovary, in the female.

	Per 10,000 living in each Age Period.							
	Under 25	Over 25.	25-35.	35-45.	45-55.	55-65.	65-75.	75 and upwards.
Male.								
Average of 1870-71-72......	0·01	0·67	0·19	0·47	0·80	2·33	3·16	—
Average of 1880-81-82......	0·06	0·55	0·08	0·26	0·59	1·41	0·93	5·29
Average of 1890-91-92......	0·04	0·58	0·13	0·21	0·60	1·51	2·26	3·05
1900	0·06	0·60	0·23	0·11	0·74	1·20	1·74	3·89
Female.								
Average of 1870-71-72......	0·01	0·16	0·05	0·26	0·25	—	0·71	—
Average of 1880-81-82......	0·04	0·52	0·19	0·23	1·04	0·95	1·17	1·20
Average of 1890-91-92......	0·03	0·90	0·19	0·51	1·68	1·57	2·52	6·59
1900	0·06	0·91	0·14	0·42	1·52	1·76	3·15	7·04

N.B.—The Testis is not included, because Penis, Testis, and Scrotum have been returned together. Tumours of the Ovary in women over 25 have increased in nearly the same proportion as the whole class of tumours here dealt with, the rates per 10,000 living being 0·04 in 1870-72, 0·13 in 1880-82, 0·23 in 1890-92, and 0·24 in 1900. Excluding the Ovary, the rates for women above 25 were 0·12 in 1870-72, 0·39 in 1880-82, 0·67 in 1890-92, and 0·67 in 1900.

14.—Cancer of the Head, Face, Nose, and Lip. (Males only.)

(Per 10,000 living at each age.)

Including Averages of 1870-71-72, 1880-81-82, and 1890-91-92 for Victoria, Queensland, Western Australia, and Tasmania, and Statistics of 1900 for Victoria, New Zealand, Queensland, and Tasmania.

	Under 25.	25 to 35.	35 to 45.	45 to 55.	55 to 65.	65 to 75.	75 and upwards.
Average of 1870-71-72	0·01	0·07	0·14	0·20	1·09	3·95	2·96
Average of 1880-81-82	0·02	0·04	0·17	0·37	1·50	3·70	6·05
Average of 1890-91-92	...	0·07	0·06	0·37	1·69	2·26	8·29
1900	...	0·09	0·11	0·19	1·44	1·96	8·55

15.—Cancer of the Tongue. (Males only.)

(Per 10,000 living at each age.)

Including Averages of 1870-71-72, 1880-81-82, and 1890-91-92 for New South Wales, Victoria, Queensland, Western Australia, and Tasmania, and Statistics of 1900 for New South Wales, Victoria, New Zealand, Queensland, and Tasmania.

	Under 25.	25 to 35.	35 to 45.	45 to 55.	55 to 65.	65 and upwards.
Average of 1870-71-72	0·01	...	0·26	0·65	0·96	2·41
Average of 1880-81-82	...	...	0·13	0·46	1·15	2·41
Average of 1890-91-92	...	...	0·12	0·93	1·92	2·76
1900	...	0·03	0·25	0·89	1·93	2·67

16.—Cancer of the Stomach.

(Per 10,000 living at each age.)

Including Statistics as in Table 15.

	Under 25.	25–35.	35–45.	45–55.	55–65.	65 and upwards.
Males.						
Average of 1870-71-72	—	0·29	0·70	2·63	5·37	6·30
Average of 1880-81-82	0·02	0·20	0·83	2·56	6·39	8·78
Average of 1890-91-92	0·02	0·14	0·84	3·53	8·38	12·84
1900	0·03	0·27	0·82	3·45	7·64	16·85
Females.						
Average of 1870-71-72	0·00	0·33	0·90	1·82	2·42	3·89
Average of 1880-81-82	0·01	0·17	0·68	1·58	4·77	5·14
Average of 1890-91-92	0·01	0·07	0·60	1·96	4·88	7·85
1900	0·02	0·13	0·59	2·17	4·66	12·89

17.—Cancer of the Liver.

(Per 10,000 living at each age.)

Including Statistics as in Table 15.

	Under 25.	25–35.	35–45.	45–55.	55–65.	65 and upwards.
Males.						
Average of 1870-71-72	—	0·12	0·34	0·79	1·05	1·11
Average of 1880-81-82	0·01	0·05	0·39	1·39	2·89	3·95
Average of 1890-91-92	0·00	0·13	0·58	1·92	3·69	5·78
1900	0·02	0·12	0·25	2·14	4·87	8·13
Females.						
Average of 1870-71-72	—	0·10	0·31	0·75	1·04	2·83
Average of 1880-81-82	0·02	0·11	0·50	1·32	3·11	3·13
Average of 1890-91-92	0·02	0·16	0·47	1·58	3·65	4·67
1900	0·03	0·03	0·68	2·02	6·10	9·79

18. Cancer of the Breast (Females only).

(Per 10,000 living at each age.)

Including Statistics as in Table 15.

	Under 25.	25-35.	35-45.	45-55.	55-65.	65 and upwards.
Average of 1870-71-72....	...	0·17	1·21	2·49	2·93	4·95
Average of 1880-81-82	...	0·23	1·00	2·04	3·56	4·23
Average of 1890-91-92.....	...	0·13	0·86	2·05	3·35	6·44
1900	...	0·03	0·64	2·02	3·99	6·36

19. Cancer of the Uterus.

(Per 10,000 living at each age.)

Including Statistics as in Table 14.

	Under 25.	25-35.	35-45.	45-55.	55-65.	65-75.	75 and upwards.
Average of 1870-71-72...	0·01	0·86	3·40	6·21	6·70	2·12	2·65
Average of 1880-81-82...	0·01	0·72	2·76	4 55	6·72	7·83	6·01
Average of 1890-91-92...	...	0·46	2·94	4·62	7·78	7·55	3·30
1900	...	0·51	2·14	4·33	7·36	9·78	11·07

20.—Special Tables of Organ-incidence of New South Wales (as supplied by the Government Statistician).

(20a.) Number of Deaths from Cancer, 1856–1900.

Period.	Externals. Head. Mouth.	Throat.	Tongue.	Others.	Total Head.	Breast.	Other.	Total External.	Internals. Respiratory.	Digestive. Stomach.	Liver.	Other.	Total Digestive.	Urinary.	Generative.	Other.	Total Internal.	Unspecified.	Total Cases.
Males.																			
1856-60......	10	6	6	6	28	2	1	31	..	25	6	3	34	1	..	2	37	65	133
1861-65......	10	11	15	17	53	1	6	60	4	29	9	10	48	1	2	..	55	81	196
1866-70......	26	20	29	20	95	4	5	104	2	76	13	18	107	4	6	2	121	90	315
1871-75......	36	23	38	31	128	2	14	144	12	122	25	29	176	13	2	8	211	158	513
1876-80......	26	31	39	60	156	2	15	173	13	134	45	44	223	17	9	2	264	186	623
1881-85......	42	51	33	56	182	2	17	201	6	185	66	58	309	23	8	3	349	192	742
1886-90......	75	122	67	63	327	2	24	353	31	248	134	148	530	27	7	8	603	176	1132
1891-95......	98	118	72	91	379	2	36	417	49	423	209	209	841	48	12	9	959	242	1618
1896-1900....	140	190	99	98	527	1	60	588	73	544	250	286	1080	54	10	12	1229	129	1946
Total.....	463	572	398	442	1875	18	178	2071	190	1786	757	805	3348	188	56	46	3828	1319	7218
Females.																			
1856-60......	5	3	1	1	10	14	..	24	1	6	1	5	12	..	37	..	50	31	105
1861-65......	4	5	2	7	18	26	..	44	..	18	3	8	29	1	46	1	77	42	163
1866-70......	3	..	1	5	9	45	5	59	3	33	9	16	58	..	86	2	149	53	261
1871-75......	7	4	2	5	18	55	7	80	3	52	18	17	87	3	133	4	230	78	388
1876-80......	6	4	2	10	22	50	6	78	3	65	30	16	111	3	115	2	234	125	437
1881-85......	9	5	..	10	24	59	9	92	7	87	56	32	175	3	177	2	364	154	610
1886-90......	10	9	1	17	37	107	24	168	18	148	95	68	311	6	219	5	559	185	912
1891-95......	10	8	8	33	59	147	23	229	22	213	147	110	470	14	355	11	872	154	1255
1896-1900....	14	21	5	43	83	212	47	342	27	304	216	211	731	23	415	18	1214	101	1657
Total.....	68	59	22	131	280	715	121	1116	84	926	575	483	1984	53	1583	45	3749	923	5788

(20B).—RATES PER 10,000 IN "SEAT OF DISEASE" GROUPS (NEW SOUTH WALES ONLY).

I.—*Males.*

Period.	Externals.							Internals.								
	Head.				Breast.	Other Externals.	Total Externals.	Respiratory.	Stomach.	Liver.	Other Digestive.	Urinary.	Generative.	Other Internals.	Total Internals.	Unspecified.
	Mouth.	Throat.	Tongue.	Others.												
1856–60	·12	·07	·07	·07	·02	·01	·36	...	·29	·07	·04	·01	...	·02	·43	·76
1861–65	.09	·10	·14	·16	...	·06	·55	·04	·28	·08	·09	...	·02	...	·51	·80
1866–70	·21	·16	·23	·16	·03	·04	·83	·02	·60	·10	15	·03	·05	·02	·97	·72
1871–75	·24	·15	·25	·21	·01	·09	·95	·08	·81	·17	·19	·09	·01	·05	1·40	1·05
1876–80	·14	·17	·21	·33	·01	·08	·94	·07	·73	·24	·24	·09	·05	· 1	1·43	1·01
1881–85	·19	·23	·15	·25	·01	·08	·91	·03	·82	·30	·26	·10	· 4	·01	1·56	·86
1886–90	·27	·44	·24	·23	·01	·09	1·28	·11	·90	·49	·54	·10	·03	·03	2·20	·64
1891–95	·31	·37	·23	·29	·01	·11	1·32	·16	1·34	·66	·66	·15	·04	·03	3·04	·77
1896–1900	·41	·56	·27	·27	...	·18	1·69	·21	1·60	·73	·84	·16	·03	·04	3·61	·38

II.—*Females.*

Period.	Mouth.	Throat.	Tongue.	Others.	Breast.	Other Externals.	Total Externals.	Respiratory.	Stomach.	Liver.	Other Digestive.	Urinary.	Generative.	Other Internals.	Total Internals.	Unspecified.
1856–60	·08	·05	·01	·01	·21	...	·36	·01	·09	·01	·07	...	·55	...	·73	·46
1861–65	·05	·06	·02	·08	·31	...	·52	...	·22	·04	·10	·01	·55	·01	·93	·50
1866–70	·03	...	·01	·05	·44	·05	·58	·03	·32	·09	·16	...	·84	·02	1·46	·52
1871–75	·06	·03	·02	·04	·44	·06	·65	·02	·42	·14	·14	·02	·97	·03	1·74	·62
1876–80	·04	·03	·02	·07	·33	·04	·53	·02	·43	20	·11	·02	·77	·02	1·57	·83
1881–85	·05	·03	...	·06	·32	·05	·50	·04	·47	·30	·17	·02	·95	·01	1 96	·82
1886–90	·04	·04	...	·07	·46	·10	·71	·08	64	·41	·29	·03	·94	·02	2·41	·80
1891–95	·04	·03	·03	·12	·54	·09	·85	·08	·78	·54	·40	·05	1·30	·04	3·19	·57
1896–1900	·05	·07	·02	·14	·70	·16	1·14	·09	1·00	·72	·70	·08	1·36	·06	4·01	·33

21.—Increase of Persons of the Cancer Age since 1871.

(*a*) Per 10,000 of total population, male or female, of Australasia, excluding Western Australia in 1900.

	45–55.	55–65.	65-75.	75 and upwards.
Males, 1871	870	423	172	45
,, 1900	738	523	294	84
Females 1871	609	297	116	30
,, 1900	616	431	221	72

(*b*) Proportion of 1900 to 1871. (1871=100.)

	45–55.	55–65.	65-75.	75 and upwards.
Males, 1900	85	124	170	187
Females 1900	101	145	191	240

(B.)

COMPARATIVE TABLES

FOR THE

AUSTRALIAN STATES AND NEW ZEALAND.

1. ANNUAL Number of Deaths from Cancer.

	Average of 1870-71-72.	Average of 1880-81-82.	Average of 1890-91-92.	1900.
MALES.				
New South Wales	77⅔	147⅔	276	409
Victoria	113	194	368⅔	435
New Zealand	No information available	67	161	246
Queensland	9⅓	30⅔	68⅓	130
South Australia	13	45⅔	80⅓	103
Western Australia	3	3	10⅔	33
Tasmania	26	31⅓	40⅓	51
FEMALES.				
New South Wales	65⅔	109⅔	217	355
Victoria	98	175	301⅔	382
New Zealand	No information available	70⅔	138	184
Queensland	6⅓	20⅓	58⅔	99
South Australia	19	39	64	107
Western Australia	2	4	7⅓	19
Tasmania	25⅓	31⅓	34	42
PERSONS.				
New South Wales	143⅓	257⅓	493	764
Victoria	211	369	670⅓	817
New Zealand	No information available	137⅔	299	430
Queensland	15⅔	51	127	229
South Australia	32	84⅔	144⅓	210
Western Australia	5	7	18	52
Tasmania	51⅓	62⅔	74⅓	93

2.—Cancer Deaths per 10,000 Living.

	Average of 1870-71-72.	Average of 1880-81-82.	Average of 1890-91-92.	1900.
Males.				
New South Wales	2·82	3·59	4·51	5·74
Victoria	2·82	4·29	6·16	7·20
New Zealand	Not obtainable	2·49	4·84	6·06
Queensland	1·30	2·45	3·05	4·64
South Australia	1·37	3·12	4·95	5·76
West Australia	1·95	1·76	3·58	3·02
Tasmania	4·82	5·09	5·15	5·68
Females.				
New South Wales	2·87	3·22	4·18	5·49
Victoria	2·97	4·26	5·57	6·40
New Zealand	Not obtainable	3·21	4·70	5·00
Queensland	1·31	2·30	3·45	4·44
South Australia	2·11	2·99	4·18	6·11
West Australia	2·13	3·16	3·67	2·80
Tasmania	5·33	5·71	4·87	5·06
Persons.				
New South Wales	2·84	3·42	4·35	5·62
Victoria	2·88	4·28	5·88	6·80
New Zealand	Not obtainable	2·81	4·77	5·56
Queensland	1·30	2·39	3·23	4·55
South Australia	1·73	3·06	4·57	5·93
West Australia	2·02	2·36	3·62	2·94
Tasmania	5·06	5·38	5·02	5·38

3.—Cancer Deaths in Percentage of Deaths from All Causes.

	Average of 1870-71-72.	Average of 1880-81-82.	Average of 1890-91-92.	1900.
Males.				
New South Wales	1·89	2·11	3·14	4·57
Victoria	1·86	2·70	3·67	5·04
New Zealand	Not obtainable	2·06	4·37	5·92
Queensland	0·80	1·32	2·00	3·53
South Australia	0·90	2·00	3·72	5·17
West Australia...........	·24	1·08	2·07	2·22
Tasmania	·11	2·94	3·26	4·76
Females.				
New South Wales	2·43	2·25	3·51	5·76
Victoria	2·28	3·27	4·05	5·80
New Zealand	Not obtainable	3·09	5·23	6·04
Queensland	1·01	1·67	3·03	4·78
South Australia	1·63	2·14	3·58	6·01
West Australia	1·78	3·13	2·77	2·52
Tasmania	4·58	4·13	3·77	5·05
Persons.				
New South Wales	2·10	2·17	3·29	5·05
Victoria.........	2·03	2·95	3·83	5·37
New Zealand	Not obtainable	2·48	4·73	5·97
Queensland	0·88	1·44	2·37	3 98
South Australia	1·23	2·06	3·66	5·56
West Australia	1·41	1·72	2·31	2·32
Tasmania	3·69	3·44	3·47	4·89

4.—Order of Cancer Mortality.

(*a.*)—Per 10,000 Persons Living.

	Average of 1870-71-72.	Average of 1880-81-82.	Average of 1890-91-92.	1900.
1.	Tasmania	Tasmania	Victoria	Victoria
2.	Victoria	Victoria	Tasmania	South Australia
3.	New South Wales	New South Wales	New Zealand	New South Wales
4.	W. Australia	South Australia	South Australia	New Zealand
5.	South Australia	New Zealand	New South Wales	Tasmania
6.	Queensland	Queensland	W. Australia	Queensland
7.	—	W. Australia	Queensland	W. Australia

(*b.*)—In percentage of Deaths from All Causes.

1.	Tasmania	Tasmania	New Zealand	New Zealand
2.	New South Wales	Victoria	Victoria	South Australia
3.	Victoria	New Zealand	South Australia	Victoria
4.	W. Australia	New South Wales	Tasmania	New South Wales
5.	South Australia	South Australia	New South Wales	Tasmania
6.	Queensland	W. Australia	Queensland	Queensland
7.	—	Queensland	W. Australia	W. Australia

5.—Population of States or Colonies.

(*See Table* 10.)

6.—Approximate Annual Deaths from All Causes.

	Average of 1870-71-72.			Average of 1880-81-82.			Average of 1890-91-92.			1900.		
	Males.	Females.	Persons.	Males.	Females.	Persons.	Males.	Females.	Persons.	Males.	Females.	Persons.
New South Wales	4111	2700	6811	6996	4865	11,861	8794	6177	14,971	8591	6167	14,758
Victoria	6075	4298	10,373	7185	5351	12,536	10,045	7448	17,493	8631	6566	15,217
New Zealand	No infor	mation	available	3258	2285	5543	3684	2639	6323	4153	3046	7199
Queensland	1166	627	1793	2323	1217	3540	3416	1936	5352	3682	2071	5753
South Australia	1444	1165	2609	2283	1822	4105	2159	1787	3946	1992	1780	3772
West Australia	243	112	355	278	128	406	516	264	780	1487	753	2240
Tasmania	836	553	1389	1065	758	1823	1237	902	2139	1071	831	1902
Total Deaths	13,875	9455	23,330	23,388	16,426	39,814	29,851	21,153	51,004	29,607	21,234	50,841

7.—Deaths from Cancer at each Age.

(a) Deaths from Cancer at each Age for the average of 1870–71–72.

	Under 5.	5-10.	10-15.	15-20.	20-25.	25-35.	35-45.	45-55.	55-65.	65-75.	75 and upwards.	Age not stated.	Total all Ages.
Males.													
New South Wales	⅔	...	..	...	1⅔	4⅔	8⅓	17⅔	23	14⅔	7	...	77⅔
Victoria	1⅓	⅔	...	...	...	7	24⅓	32	29	16⅓	2⅓	...	113
New Zealand (no information available)	...	...	...	...	...	...	...	...	...	...	...	...	...
Queensland	...	...	...	⅓	...	1	2⅓	1⅓	3⅔	⅓	⅓	...	9⅓
South Australia	1⅔	...	...	...	⅓	1	3⅓	2⅓	2	1⅔	⅔	...	13
West Australia	...	...	...	...	...	⅓	⅓	⅔	⅔	1	...	...	3
Tasmania	...	...	...	⅓	...	⅓	2⅓	6	7⅔	6⅓	3	...	26
Total Males	3⅔	⅔	...	⅔	2	14⅓	41	60	66	40⅓	13⅓	...	242
Females.													
New South Wales	1	...	...	...	...	3⅔	12⅔	22	15⅓	9	2	...	65⅔
Victoria	⅔	...	...	⅓	⅓	10⅓	29⅔	32⅔	16⅔	6⅔	⅔	...	98
New Zealand (no information available)	...	...	...	...	...	...	...	...	...	...	...	...	...
Queensland	...	...	...	...	...	1	2	1⅔	1	⅓	...	⅓	6⅓
South Australia	⅔	...	...	...	...	2⅔	3⅓	6	4⅔	1⅔	...	...	19
West Australia	...	...	...	...	...	...	1	1	...	...	...	...	2
Tasmania	...	...	...	...	⅓	⅔	6⅔	7	4⅓	5	1⅓	...	25⅓
Total Females	2⅓	...	...	⅓	⅔	18⅓	55⅓	70⅓	42	22⅔	4	⅓	216⅓
Total Persons	6	⅔	...	1	2⅔	32⅔	96⅓	130⅓	108	63	17⅓	⅓	458⅓

7.—Deaths from Cancer at each Age.

(*b*) Deaths from Cancer at each Age for the average of 1880–81–82.

Males.

	Under 5.	5-10.	10-15.	15-20.	20-25.	25-35.	35-45.	45-55.	55-65.	65-75.	75 and upwards.	Age not stated.	Total all Ages.
New South Wales	1	⅔	...	1⅓	1⅓	6⅓	15⅓	30	38⅓	36⅔	15⅓	1⅓	147⅔
Victoria	1⅔	1⅓	1	⅓	1	4	20⅓	55⅔	61⅔	34	13	...	194
New Zealand	⅔	...	...	...	⅓	3⅓	9⅔	22⅔	15⅔	10	4⅔	...	67
Queensland	⅓	⅓	...	⅔	1⅓	1⅔	3⅔	10⅔	6⅔	3	1⅓	1	30⅔
South Australia	⅓	...	...	⅔	⅔	2	2	14	14	9⅓	2⅔	...	45⅔
West Australia	⅓	...	...	...	...	...	⅓	1⅔	⅔	...	...	...	3
Tasmania	⅓	...	...	...	⅓	1	1⅔	3⅓	9	9⅔	6	...	31⅓
Total Males	4⅔	2⅓	1	3	5	18⅓	53	138	146	102⅔	43	2⅓	519⅓

Females.

	Under 5.	5-10.	10-15.	15-20.	20-25.	25-35.	35-45.	45-55.	55-65.	65-75.	75 and upwards.	Age not stated.	Total all Ages.
New South Wales	1⅓	⅓	⅓	⅔	⅔	8	21⅓	32⅓	23	16⅔	5	...	109⅔
Victoria	⅔	⅔	⅓	1⅓	1⅔	13	31⅓	52⅓	47⅓	20⅔	5⅔	...	175
New Zealand	1⅔	⅓	⅓	...	...	5⅓	13⅔	21	16	9⅓	3	...	70⅔
Queensland	⅓	...	⅓	...	⅔	2	4⅓	7	3⅔	2	...	...	20⅓
South Australia	...	...	...	⅔	1	3⅓	7	12⅓	9⅓	4	1⅓	...	39
West Australia	...	...	...	...	...	1	⅔	1⅔	⅓	⅓	...	...	4
Tasmania	...	...	...	...	...	⅔	4	8	7⅔	5⅔	5⅓	...	31⅓
Total Females	4	1⅓	1⅓	2⅔	4	33⅓	82⅓	134⅔	107⅓	58⅔	20⅓	...	450
Total Persons	8⅔	3⅔	2⅓	5⅔	9	51⅔	135⅓	272⅔	253⅓	161⅓	63⅓	2⅓	969⅓

7.—Deaths from Cancer at each Age.

(c) Deaths from Cancer at each Age for the average of 1890–91–92.

Males.

	Under 5.	5–10.	10–15.	15–20.	20–25.	25–35.	35–45.	45–55.	55–65.	65–75.	75 and upwards.	Age not stated.	Total all Ages.
New South Wales	3	1	⅔	1	4⅔	10⅔	26⅔	64⅓	82⅔	57	23⅔		276
Victoria	1⅓	⅔	⅔	1	2	9	24	66⅔	135⅔	97	30⅔	...	368⅔
New Zealand	1	1	...	1⅓	1⅓	3⅔	13⅔	40⅔	55	34⅓	8⅔	...	161
Queensland	⅓	⅓	⅓	...	⅔	3⅔	6⅔	20⅔	21	11	3⅔	...	68⅓
South Australia	⅔	⅔	...	1	...	2⅓	6⅔	16⅔	25	20⅔	6⅔	...	80⅓
West Australia	...	...	...	...	...	⅓	1	3	2⅔	3	⅔	...	10⅔
Tasmania	⅓	...	...	...	...	⅔	3	3⅔	10	15⅔	7	...	40⅓
Total Males	6⅔	3⅔	1⅔	4⅓	9	30⅓	81⅔	215⅔	332	238⅔	81	⅔	1005⅓

Females.

	Under 5.	5–10.	10–15.	15–20.	20–25.	25–35.	35–45.	45–55.	55–65.	65–75.	75 and upwards.	Age not stated.	Total all Ages.
New South Wales	1⅓	1	1	⅔	3⅓	9⅔	32⅓	57⅓	59⅔	34⅔	16	...	217
Victoria	⅔	⅔	⅓	⅔	1⅓	16	35⅔	70⅓	92⅔	64⅔	18⅔	...	301⅔
New Zealand	1	⅓	⅓	...	1⅓	5⅓	22	39⅓	37	24⅓	7	...	138
Queensland	...	...	...	...	⅓	3⅔	11	20⅓	15	6⅓	2	...	58⅔
South Australia	⅓	⅓	⅓	⅓	1	2⅔	8⅓	14⅔	18⅔	12⅔	4⅔	...	64
West Australia	...	...	...	...	...	⅔	1	3⅓	1⅔	⅓	⅓	...	7⅓
Tasmania	...	...	⅓	...	⅓	1	5	8⅓	10	7⅓	1⅔	...	34
Total Females	3⅓	2⅓	2⅓	1⅔	7⅔	39	115⅓	213⅔	234⅔	150⅓	50⅓	...	820⅔
Total Persons	10	6	4	6	16⅔	69⅓	197	429⅓	566⅔	389	131⅓	⅔	1826

7.—Deaths from Cancer at each Age.

(d) Deaths from Cancer at each Age in 1900.

	Under 5.	5-10.	10-15.	15-20.	20-25.	25-35.	35-45.	45-55.	55-65.	65-75.	75 and upwards.	Age not stated.	Total all Ages.
Males.													
New South Wales	1	...	...	...	2	11	27	75	124	120	49	...	409
Victoria	...	2	1	...	2	17	23	65	115	150	60	...	435
New Zealand	1	...	1	4	1	3	6	36	92	70	32	...	246
Queensland	...	1	...	1	...	8	14	28	38	34	6	...	130
South Australia	3	...	...	...	1	4	6	15	39	25	10	...	103
West Australia	1	...	...	...	...	1	5	8	8	8	2	...	33
Tasmania	...	2	1	...	1	2	5	12	11	6	11	...	51
Total Males	6	5	3	5	7	46	86	239	427	413	170	...	1407
Females.													
New South Wales	1	1	2	2	...	10	43	83	99	72	42	...	355
Victoria	1	...	...	1	1	20	39	74	89	113	44	...	382
New Zealand	1	...	...	1	1	5	17	39	61	40	19	...	184
Queensland	...	...	...	...	...	4	21	24	28	18	4	...	99
South Australia	1	1	...	...	1	5	14	19	32	23	11	...	107
West Australia	...	...	...	...	1	1	5	5	5	1	1	...	19
Tasmania	...	...	...	...	...	1	5	7	13	11	5	...	42
Total Females	4	2	2	4	4	46	144	251	327	278	126	...	1188
Total Persons	10	7	5	9	11	92	230	490	754	691	296	...	2595
Excluding Western Australia.													
Males	5	5	3	5	7	45	81	231	419	405	168	...	1374
Females	4	2	2	4	3	45	139	246	322	277	125	...	1169
Persons	9	7	5	9	10	90	220	477	741	682	293	...	2543

8.—Deaths from Cancer per 10,000 Persons Living at each Age.

	New South Wales.				Victoria.				New Zealand.				Queensland.				South Australia.				Western Australia.				Tasmania.			
	1870-71-72 average.	1880-81-82 average.	1890-91-92 average.	1900.	1870-71-72 average.	1880-81-82 average.	1890-91-92 average.	1900.	1870-71-72 average.	1880-81-82 average.	1890-91-92 average.	1900.	1870-71-72 average.	1880-81-82 average.	1890-91-92 average.	1900.	1870-71-72 average.	1880-81-82 average.	1890-91-92 average.	1900.	1870-71-72 average.	1880-81-82 average.	1890-91-92 average.	1900.	1870-71-72 average.	1880-81-82 average.	1890-91-92 average.	1900.
Males.																												
Under 5	1·16	·18	·36	·12	·23	·29	·18	..	No information available.	·159	·237	·213	..	·20	·11	..	1·05	·16	·29	1·19	..	1·60	..	No information available.	..	·40	·30	..
5 to 10	..	·13	·14	..	·13	·24	·10	·27		..	·229	..	..	·24	·14	·31	..	..	·30	..	..	..	..		..	..	..	1·79
10 to 15	..	..	·11	..	..	·18	·11	·15		..	..	·210	..	..	·17	..	..	..	..	..	..	..	..		..	..	..	·94
15 to 20	..	·35	·18	..	..	·07	·17	..		..	·408	·897	·78	·71	..	·41	..	·45	·66	..	..	..	..		·56	..	..	..
20 to 25	·78	·33	·80	·32	..	·25	·32	·51		·149	·586	·265	..	1·09	·28	...	·47	·41	..	·61	..	..	..		..	·55	..	1·21
25 to 35	1·00	·98	·95	1·00	1·13	·80	·81	1·68		·755	·800	·506	·56	·70	·79	1·70	·73	·82	·90	1·40	1·19	..	·49		·51	1·35	·49	1·46
35 to 45	2·28	2·96	3·70	2·76	3·32	4·12	4·29	2·72		2·390	3·568	1·314	2·07	1·83	2·44	3·43	3·13	1·24	3·77	3·08	1·10	1·51	2·95		5·23	3·27	3·88	4·32
45 to 55	7·98	8·51	12·89	12·41	8·28	10·16	14·83	15·49		9·632	12·030	10·180	2·74	10·26	10·64	11·95	3·20	13·48	14·21	11·61	3·71	7·06	12·29		13·31	6·48	7·41	18·25
55 to 65	17·27	21·89	28·05	34·75	19·24	22·01	31·92	30·55		18·075	29·522	34·127	23·33	17·63	23·61	25·62	5·19	23·01	33·44	47·29	9·03	5·13	13·93		19·10	19·63	25·63	29·44
65 to 75	25·43	42·46	47·09	57·29	32·29	34·55	52·75	56·58		32·744	53·415	66·063	5·16	23·83	39·01	53·30	11·28	34·45	50·59	55·56	38·76	..	33·44		25·57	34·25	53·16	24·77
75 and upwards	45·57	52·23	49·90	77·57	21·61	45·12	58·55	88·43		51·322	47·872	103·694	22·00	44·04	47·85	38·56	14·43	32·13	47·52	64·72	..	..	32·52		31·03	54·39	49·16	77·58
Age unspecified	..	..	..	..	..	..	..	..		..	..	..	..	3·73	..	..	..	..	..	..	..	..	..		..	..	..	..
All Ages	2·82	3·59	4·51	5·74	2·82	4·29	6·16	7·20		2.486	4·837	6·059	1·30	2·45	3·05	4·64	1·37	3·12	4·95	5·76	1·95	1·76	3·58		4·82	5·09	5·15	5·68
Females.																												
Under 5	·25	·24	·16	·13	·12	·12	·09	·14		·408	·244	·220	..	·21	..	..	·43	..	·15	·39	..	..	..		..	..	..	..
5 to 10	..	·07	·14	·12	..	·12	·10	..		·098	·077	..	..	..	..	..	..	..	·16	·41	..	..	..		..	..	..	..
10 to 15	..	·08	·16	·25	..	·06	·06	..		·148	·082	..	..	·29	..	..	..	..	·18	..	..	..	..		..	..	·40	..
15 to 20	..	·18	·12	·28	·12	·26	·12	·18		..	..	·224	..	..	..	..	..	·44	·21	..	..	..	..		..	..	..	..
20 to 25	..	·19	·62	..	·13	·39	·22	·21		..	·446	·262	..	·77	·18	..	..	·72	·67	·58	..	..	..		·64	..	·50	..
25 to 35	1·05	1·71	1·15	·97	2·09	2·65	1·68	1·78		1·716	1·324	·896	1·06	1·62	1·31	1·15	2·11	1·86	1·13	1·86	..	6·51	2 02		1·15	1·01	·90	·82
35 to 45	5·65	6·20	6·52	5·72	7·13	7·32	7·43	5·30		5·634	7·708	4·668	4·01	4·35	7·16	8·49	3·52	5·51	5·71	8·39	10·40	5·27	5·74		15·26	7·91	8·00	5·15
45 to 55	15·81	15·57	17·09	19·07	16·42	15·07	18·00	18·66		16·156	18·079	14·548	7·45	14·17	18·90	17·71	10·46	13·99	14·06	15·93	20·12	20·40	2·76		19·22	18·98	18·39	12·76
55 to 65	20·78	20·05	32·10	35·76	19·47	29·35	31·79	26·52		29·117	34·846	37·129	12·35	17·39	30·27	31·40	15·00	18·89	26·34	39·51	..	8·27	2·30		18·62	28·42	30·28	35·94
65 to 75	33·17	31·96	40·29	49·66	20·77	32·68	53·96	59·40		41·192	54·785	60·259	10·65	26·95	33·87	47·36	12·85	17·32	34·21	54·35	..	21·79	11·65		44·72	43·85	41·88	49·20
75 and upwards	27·74	30·64	50·33	82·00	8·89	27·58	49·55	83·52		43·290	44·728	75·099	..	..	40·24	34·07	..	17·80	32·86	67·78	..	..	36·63		33·33	115·35	23·86	51·81
Age unspecified	..	..	..	..	..	..	..	..		..	..	..	51·56	..	..	..	..	..	..	..	..	..	..		..	..	..	..
All Ages	2·87	3·22	4·18	5·49	2·97	4·26	5·57	6·40		3·222	4·697	5·002	1·31	2·30	3·45	4·44	2·11	2·99	4·18	6·11	2·12	3·16	3·67		5·33	5·71	4·87	5·06

9.—Deaths from Cancer in percentage of Deaths from all causes at each Age.

	New South Wales.				Victoria.				New Zealand.			
	1870-71-72 average.	1880-81-82 average.	1890-91-92 average.	1900.	1870-71-72 average.	1880-81-82 average.	1890-91-92 average.	1900.	1870-71-72 average.	1880-81-82 average.	1890-91-92 average.	1900.
Males.									No information available.			
Under 5	·04	·04	·10	·04	·05	·07	·04	..		·049	·087	·096
5 to 10	..	·42	·39	..	·27	·68	·24	·98		..	·781	..
10 to 15	..	..	·48	..	..	·70	·44	·72		..	..	1·429
15 to 20	..	·89	·55	..	..	·18	·48	..		..	1·099	3·571
20 to 25	1·50	·56	1·68	·62	..	·41	·56	·75		·264	1·710	·680
25 to 35	1·39	1·26	1·45	1·85	1·45	·95	1·11	2·82		1·193	1·564	1·075
35 to 45	1·99	2·37	3·70	3·25	2·99	3·57	3·80	3·31		2·691	4·810	1·923
45 to 55	4·33	4·41	7·87	9·05	4·73	5·77	8·06	10·55		6·493	9·612	10·141
55 to 65	5·75	6·06	9·35	11·81	6·26	6·78	9·32	11·59		6·471	11·270	16·758
65 to 75	4·28	6·21	7·55	10·39	5·41	5·43	7·83	9·29		6·061	9·304	9·589
75 and upwards	3·35	3·15	3·38	5·17	1·68	3·41	3·74	5·18		4·161	3·506	6·941
Age unspecified	..	1·80	1·67	..	..	..	..	..		..	..	..
All Ages	1·89	2·11	3·14	4·57	1·86	2·70	3·67	5·04		2·056	4·370	5·923
Females.												
Under 5	·08	·06	·05	·04	·03	·03	·02	·06		·150	·109	·118
5 to 10	..	·24	·43	·68	..	·34	·28	..		·292	·287	..
10 to 15	..	·34	·93	1·59	..	·26	·23	..		·434	·423	..
15 to 20	..	·49	·40	1·27	·29	·68	·31	·55		..	..	·855
20 to 25	..	·36	1·50	..	·24	·66	·40	·43		..	·893	·719
25 to 35	1·68	2·13	1·89	1·86	2·79	3·02	2·30	3·26		2·652	2·456	1·923
35 to 45	5·23	5·50	7·32	8·14	6·65	6·33	6·77	6·27		6·599	9·691	7·489
45 to 55	11·98	10·16	14·33	19·35	12·35	10·59	13·17	17·17		15·000	17·716	15·789
55 to 65	8·61	7·36	14·15	18·54	8·55	11·69	13·29	12·94		14·414	18·137	18·598
65 to 75	6·37	5·52	7·60	12·46	4·48	6·30	9·89	12·01		10·976	12·111	10·312
75 and upwards	2·22	2·17	3·52	6·53	·78	2·14	3·48	5·46		3·797	3·684	5·810
Age unspecified	..	..	..	..	..	..	..	..		..	..	..
All Ages	2·43	2·25	3·51	5·76	2·28	3·27	4·05	5·80		3·107	5·229	6·039

	Queensland.				South Australia.				Western Australia.				Tasmania.			
	1870-71-72 average.	1880-81-82 average.	1890-91-92 average.	1900.	1870-71-72 average.	1880-81-82 average.	1890-91-92 average.	1900.	1870-71-72 average.	1880-81-82 average.	1890-91-92 average.	1900.	1870-71-72 average.	1880-81-82 average.	1890-91-92 average.	1900.
Males.																
Under 5	..	·04	·03	..	·21	·03	·09	·50	..	·46	..	·20	..	·10	·09	..
5 to 10	..	·70	·32	1·41	..	..	·86	..	..	..	..	..	..	..	..	9·09
10 to 15	..	..	·75	..	..	..	..	..	..	..	..	..	..	..	..	4·76
15 to 20	1·23	·55	..	·71	..	1·01	1·75	..	..	..	..	..	1·80	..	..	..
20 to 25	..	·61	·25	..	·81	·81	..	1·61	..	..	..	..	..	·99	..	3·03
25 to 35	·60	·51	·78	2·01	1·03	1·13	1·51	3·10	1·39	..	·53	·50	1·08	2·14	·73	3·70
35 to 45	1·60	1·49	2·01	3·29	3·23	1·13	4·01	3·53	·66	1·35	2·59	2·22	4·65	4·18	4·33	6·85
45 to 55	1·37	4·92	5·85	7·82	2·36	7·95	9·21	8·38	1·77	3·79	7·03	6·06	5·88	4·93	5·86	14·28
55 to 65	5·29	5·24	8·46	9·31	1·87	8·12	12·56	18·40	2·30	1·54	4·08	6·61	6·37	6·72	9·71	12·94
65 to 75	1·09	4·17	6·76	9·44	2·29	6·44	9·13	9·73	9·68	..	4·50	7·48	4·51	5·07	7·57	4·23
75 and upwards	2·22	3·42	3·59	3·31	2·00	2·74	3·15	4·17	..	..	2·04	3·03	2·92	3·77	3·10	4·35
Age unspecified	..	1·02	..	..	..	..	..	..	..	..	..	..	..	..	..	..
All Ages	·80	1·32	2·00	3·53	·90	2·00	3·72	5·17	1·24	1·08	2·07	2·22	3·11	2·94	3·26	4·76
Females.																
Under 5	..	·05	..	..	·10	..	·05	·18	..	..	..	..	..	..	..	..
5 to 10	..	..	..	..	..	..	·42	2·33	..	..	..	..	..	..	..	..
10 to 15	..	1·27	..	..	..	..	·79	..	..	..	..	..	..	..	1·77	..
15 to 20	..	..	..	..	..	1·07	·58	..	..	..	..	..	..	..	..	..
20 to 25	..	1·08	·39	..	..	1·29	1·44	1·28	..	..	..	2·27	1·41	..	·90	..
25 to 35	1·40	1·69	1·79	2·05	3·46	2·37	1·81	3·82	..	·88	3·12	1·03	1·66	1·29	1·30	1·82
35 to 45	4·23	4·18	8·35	10·94	4·74	5·48	6·08	8·38	11·11	7·14	6·00	5·81	12·20	7·89	8·48	6·25
45 to 55	6·94	12·21	15·56	17·52	8·57	11·38	12·02	17·12	14·29	16·66	18·18	14·29	12·07	12·56	15·54	13·46
55 to 65	6·52	7·75	13·39	17·61	7·00	9·86	12·81	22·38	..	4·35	8·06	15·63	7·80	12·03	13·16	19·12
65 to 75	3·33	5·56	8·56	11·39	3·11	4·04	7·65	11·06	..	3·70	2·13	4·35	8·83	7·18	7·23	9·74
75 and upwards	..	..	3·35	3·31	..	1·78	2·47	4·91	..	..	2·13	4·17	3·80	6·95	1·55	4·11
Age unspecified	3·85	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
All Ages	1·01	1·67	3·03	4·78	1·63	2·14	3·58	6·01	1·78	3·14	2·77	2·52	4·58	4·13	3·77	5·05

10.—Population and Persons Living at each Age.

(A.) Persons Living at each Age at Census of 1871.

Males.

	Under 5.	5-10.	10-15.	15-20.	20-25.	25-35.	35-45.	45-55.	55-65.	65-75.	75 and upwards.	Total All Ages.
New South Wales	41,767	35,936	29,212	21,141	21,321	46,811	36,597	22,144	13,320	5766	1536	275,551
Victoria	58,937	53,549	43,012	26,264	24,004	62,132	73,281	38,663	15,073	5057	1078	401,050
New Zealand (no information available)	...	...	...	...	...	...	...	...	...	...	...	...
Queensland	11,147	7601	5420	4339	5703	18,479	11,652	4997	1618	657	154	71,767
South Australia	15,931	14,270	12,033	8587	7049	13,708	10,669	7307	3860	1480	342	95,236
West Australia	1792	1547	1275	1032	1061	2805	3019	1797	738	258	51	15,375
Tasmania	7202	6443	6202	5938	5294	6468	4476	4507	4017	2476	967	53,990
Total Males	136,776	119,346	97,154	67,301	64,432	150,403	139,694	79,415	38,626	15,694	4128	912,969

Females.

	Under 5.	5-10.	10-15.	15-20.	20-25.	25-35.	35-45.	45-55.	55-65.	65-75.	75 and upwards.	Total All Ages.
New South Wales	40,388	34,738	28,580	21,582	21,041	34,972	22,401	13,915	7379	2713	721	228,430
Victoria	57,751	52,954	42,573	28,292	25,418	49,495	41,570	19,896	8563	3212	754	330,478
New Zealand (no information available)	...	...	...	...	...	...	...	...	...	...	...	...
Queensland	10,344	7221	4958	3777	4133	9469	4994	2246	811	310	74	48,337
South Australia	15,533	14,271	11,695	8959	7183	12,625	9486	5740	3115	1298	284	90,189
West Australia	1735	1570	1238	1033	694	1328	962	497	234	87	32	9410
Tasmania	7029	6074	5809	5809	5167	5727	4370	3643	2331	1118	399	47,476
Total Females	132,780	116,828	94,853	69,452	63,636	113,616	83,783	45,937	22,433	8738	2264	754,320
Total Persons	269,556	236,174	192,007	136,753	128,068	264,019	223,477	125,352	61,059	24,432	6392	1,667,289

10.—Population and Persons Living at each Age.

(B.) Persons Living at each Age at Census of 1881.

Males.

	Under 5.	5-10.	10-15.	15-20.	20-25.	25-35.	35-45.	45-55.	55-65.	65-75.	75 and upwards.	Total All Ages.
New South Wales	56,414	50,094	45,268	38,336	40,231	64,692	51,805	35,228	17,512	8634	2935	411,149
Victoria	57,846	54,843	54,330	49,445	40,593	50,115	49,382	54,793	28,013	9842	2881	452,083
New Zealand	41,787	34,429	28,979	21,136	22,158	44,277	40,563	23,610	8695	3065	906	269,605
Queensland	16,532	13,936	11,960	9562	12,495	24,211	20,546	10,622	3866	1287	308	125,325
South Australia	21,012	17,391	16,196	14,745	16,226	24,504	16,098	10,389	6084	2708	830	146,183
West Australia	2082	1889	1813	1514	1394	1943	2204	2360	1300	447	116	17,062
Tasmania	8216	7351	7075	6775	6041	7380	5108	5143	4584	2824	1103	61,600
Total Males	203,889	179,933	165,621	141,513	139,138	217,122	185,706	142,145	70,054	28,807	9079	1,483,007

Females.

	Under 5.	5-10.	10-15.	15-20.	20-25.	25-35.	35-45.	45-55.	55-65.	65-75.	75 and upwards.	Total All Ages.
New South Wales	55,056	49,232	43,488	37,635	34,545	46,852	34,424	20,769	11,472	5214	1632	340,319
Victoria	56,359	54,461	53,923	51,191	43,324	48,946	42,816	34,735	16,126	6325	2057	410,263
New Zealand	40,720	33,666	28,794	21,585	19,319	31,114	24,285	12,399	5504	2268	674	220,328
Queensland	15,790	13,439	11,224	8722	8698	12,336	9969	4950	2116	743	213	88,200
South Australia	20,638	17,345	16,056	14,985	13,829	17,860	12,701	8817	4941	2310	749	130,231
West Australia	2072	1848	1745	1548	1222	1535	1264	817	403	153	39	12,646
Tasmania	8129	7023	6717	6719	5976	6624	5055	4214	2696	1293	462	54,908
Total Females	198,764	177,014	161,947	142,385	126,913	165,267	130,514	86,701	43,258	18,306	5826	1,256,895
Total Persons	402,653	356,947	327,568	283,898	266,051	382,389	316,220	228,846	113,312	47,113	14,905	2,739,902

10.—Population and Persons Living at each Age

(C.) Persons Living at each Age at Census of 1891.

Males.

	Under 5.	5-10.	10-15.	15-20.	20-25.	25-35.	35-45.	45-55.	55-65.	65-75.	75 and upwards.	Total All Ages.
New South Wales	84,197	73,054	62,366	54,385	58,089	112,255	71,983	49,916	29,470	12,104	4743	612,562
Victoria	75,229	65,460	59,042	57,284	63,437	110,980	55,901	44,956	42,500	18,387	5238	598,414
New Zealand	42,348	43,585	40,841	32.647	28,396	45,821	38,348	33,869	18,669	6440	1913	332,877
Queensland	30,743	24,040	20,086	18,372	23.930	46,774	27,631	19,605	8977	2847	774	223,779
South Australia	22,955	21,792	19,139	15,257	14,813	25,891	17,690	11,729	7487	4085	1403	162,241
West Australia	3460	2802	2414	2247	3305	6733	3390	2441	1913	897	205	29,807
Tasmania	11,022	10,046	8425	7193	7276	13,390	7722	4952	3902	2948	1424	78,300
Total Males	269,954	240,779	212,313	187,385	199,246	361,844	222,665	167,468	112,918	47,708	15,700	2,037,980

Females.

	Under 5.	5-10.	10-15.	15-20.	20-25.	25-35.	35-45.	45-55.	55-65.	65-75.	75 and upwards.	Total All Ages.
New South Wales	81,805	71,419	61,237	54,522	53,486	83,710	49,581	33,539	18,589	8605	3179	519,672
Victoria	73,508	63,994	57,903	57,886	61,676	95,088	47,972	39,067	29,144	11,985	3768	541,991
New Zealand	40,983	42,626	40,366	32,688	29,833	40,303	28,569	21,774	10,628	4445	1566	293,781
Queensland	29.924	23,313	19,290	17,159	18,683	28,073	15,386	10,777	4964	1872	498	169,939
South Australia	22,211	21,240	18,623	15,574	14,862	23,543	14,594	10,435	7087	3703	1421	153,292
West Australia	3400	2615	2397	2071	2146	3295	1741	1208	725	286	91	19,975
Tasmania	10,731	9614	8257	6888	6649	11,097	6248	4529	3303	1751	700	69,767
Total Females	262,562	234,821	208,073	186,788	187,335	285,109	164,091	121,329	74,440	32,647	11,223	1,768,417
Total Persons	532,516	475,600	420,386	374,173	386,581	646,953	386,756	288,797	187,358	80,355	26,923	3,806,397

10.—Population and Persons Living at each Age.

(D.) Persons living at each age in 1900 (largely computed).

Males.

	Under 5.	5-10.	10-15.	15-20.	20-25.	25-35.	35-45.	45-55.	55-65.	65-75.	75 and upwards.	Census total all ages.
New South Wales	80,870	84,773	82,121	70,890	62,877	109,628	97,918	60,432	35,684	20,946	6317	712,456
Victoria	71,490	75,410	66,400	52,790	39,500	101,170	84,550	41,950	37,650	26,510	6785	604,205
New Zealand	46,933	48,151	47,582	44,578	37,757	59,315	45,674	35,362	26,958	10,596	3086	405,992
Queensland	32,006	32,651	29,792	24,437	25,499	47,602	41,356	23,710	15,010	6454	1574	280,092
South Australia	25,285	24,004	21,081	16,805	16,317	28,519	19,485	12,919	8247	4500	1545	178,707
West Australia (Age distribution not available)	...	...	...	...	...	...	...	...	...	...	...	109,122
Tasmania	10,735	11,194	10,682	9416	8286	13,739	11,570	6577	3736	2422	1418	89,775
Total Males	267,319	276,183	257,658	218,916	190,236	359,973	300,553	180,950	127,285	71,428	20,725	2,380,349
Females.												
New South Wales	78,842	82,237	80,345	70,961	65,160	103,091	75,219	43,514	27,687	14,499	5122	646,677
Victoria	69,930	74,590	66,630	54,920	47,830	112,190	73,640	39,650	33,560	19,025	5268	597,233
New Zealand	45,548	46,941	46,904	44,631	38,103	55,779	36,416	26,808	16,429	6638	2530	366,727
Queensland	31,053	31,327	28,912	23,171	21,627	34,832	24,766	13,571	8931	3808	1176	223,174
South Australia	25,383	24,274	21,283	17,798	16,985	26,906	16,679	11,926	8099	4232	1623	175,188
West Australia (Age distribution not available)	...	...	...	...	...	...	...	...	...	...	...	67,951
Tasmania	10,186	10,887	10,509	9082	8166	12,161	9705	5485	3618	2236	965	83,000
Total Females	260,942	270,256	254,583	220,563	197,871	344,959	236,425	140,954	98,324	50,438	16,684	2,159,950
Total Persons	528,261	546,439	512,241	439,479	388,107	704,932	536,978	321,904	225,609	121,866	37,409	4,540,299

THE SOUTH AUSTRALIAN STATISTICS OF CANCER

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As cancer has been made the subject for general discussion at this session of the Congress, and the Secretary asked me to take part in it, I have prepared a short paper on the South Australian statistics of the disease. My information has been derived from the annual reports of the Registrar-General of the State, extending from 1874 to 1900. That for 1901 has not yet been issued. Four censuses have been taken during this period—in 1876, 1881, 1891, and 1901. Unfortunately, only the first portion of the last has been published, and this part gives merely the total population of males, females, and persons, without dividing them into age-groups, and is, therefore, of very little value. To ensure as great accuracy as possible, I have divided twenty of the years into quinquennial periods, grouped around the dates of the censuses; thus—1874, '75, '76, '77, '78, with 1876 for its centre; 1879, '80, '81, '82, and '83, with 1881 for its centre; 1884, '85, '86, '87, '88, with 1886 for its centre; and 1889, '90, '91, '92, '93, with 1891 for its centre. The figures for the 1886 census were calculated from those of 1881 and 1891 by taking the mean of the two. The years subsequent to 1893 could not be utilised, where age-groups of population were required for calculation, owing to want of the 1901 census figures.

The numbers to work on are rather small, as our population is only about one-third of a million, and deductions must be drawn with a certain degree of diffidence; but, carefully and guardedly used, they yield results which may be taken as fairly accurate, and which are very interesting and suggestive.

PREVALENCE OF THE DISEASE.

During the 27 years, 1874-1900, there have been registered in South Australia (exclusive of the Northern Territory, and not embracing the Aborigines) 3282 deaths from cancer, or an average of 122 per annum—about ten every month. Our annual rate of mortality per million of population living at all ages is 382, whereas that of England and Wales for the 27 years, 1871-1897, was 637. So that our death-rate is 60 per cent. of that of the Old Country.

If the figures were quite comparable, the comparison would be very favourable to our people. But it is not sufficiently exact. Two populations may differ so widely in certain respects as to make a comparison of them actually misleading. Cancer is a disease the incidence of which rapidly increases with advancing age. If, therefore, one community is much younger than another, it may show a very much smaller death-rate from cancer, not because the natural history of the disease is different in the community, but because the age has not been reached at which the complaint becomes most common. Now, a very marked difference exists in respect to age between the people in South Australia and in England. For instance, *there* the number of people above the age of 45 constitutes 42 per cent. of the total population, whereas *here*, according to the census of 1891, it is only 15 per cent. Since the incidence of cancer rises very rapidly with age, it is easy to understand how, with the same natural history of cancer, but with such a disparity of age, the number of deaths per million of population may be very much less in South Australia than in England.

This diversity has to be eliminated in order to institute a proper comparison between the two peoples. It is done in this way: The population is divided into age-groups of ten years, from 25 to 35, from 35 to 45, and so on. (As regards the complaint under consideration, persons under 25 years of age may be disregarded, because the number of cases under that age is quite insignificant.) The number of deaths from cancer occurring during these different decades is determined, and from these data the mortality of population at each decade of life. Next a Standard Life Table of one million people from 25 years of age upwards is constructed, and the million people are distrbuted among these decades according to a certain ratio, elaborated from the experience of vital statisticians.

In comparing any two communities, the number of persons in a decade, say 25 to 35, in this Standard Table is multiplied by the annual mortality per million at that decade in each of the two populations, and so for each consecutive decade. In this way, with a theoretical population the same for both communities, the number of deaths per million is arrived at which would be found supposing their populations had an identical age-distribution; and now it is possible to contrast them, because they have been reduced to corresponding conditions.

The Standard Age Table employed by me is that known as "The English Life Table, No. 3, Persons." As a result of this mode of calculation, it appears that for the 20 years, 1874-93, the annual mortality per million for persons, including both males and females, for South Australia is 1230, and for England and Wales for the same period 1491. Our mortality, therefore, is 82·6 per cent. of that of the Old Country. We notice how this method of comparison raises our percentage from 60 per cent. to 82·6 per cent. If we separate the statistics of males and females, we find that in South Australia the mortality of the former for the 20 years, per million, with the age-distribution table, is 1213, and of the latter 1247, and in England and Wales 1157 and 1826 respectively. We thus learn that among men the mortality in our State from cancer is really higher than in England and Wales, as 1213 to 1157, and that it is the very low comparative mortality of women here, as 1248 to 1826, which makes our death-rate as a whole lower—only 83 per cent.—than that of the Old Country.

Mortality Among Women.

Of the 3282 deaths from cancer and malignant disease registered during the past 27 years, 1690 occurred in males, and 1592 in females.

In this State the males during nearly the whole of this period have considerably outnumbered the females, to such an extent that, if the death-rate from cancer were exactly the same in the two sexes, with 1690 males registered, there should be 1591 females. The number of females registered was 1592. We notice, therefore, that in South Australia the mortality from this complaint is just the same in females as in males.

Most mortality statistics show a much higher mortality among women. Those, for example, of Frankfort-on-the-Main give for every 2000 (2012) deaths among males aged 25 years and over, 3000 (3046) deaths among women for the same ages, when the statistics have been corrected for any difference in the numbers of the two sexes living in the population. That is to say, women in Frankfort are half as obnoxious again to cancer as men; for every 100 men who die of it, 150 women die. Again, the Registrar-General's returns for England and Wales from 1860 to 1890, and for Scotland from 1860 to 1889, and for Ireland from 1864 to 1890, males and females above 25 years of age distributed in age-groups (according to English Life Table, No. 3, Persons) give an average of 922 annual deaths from cancer in males and 1324 in females, or an excess of 45 per cent. of the latter over the former.

If our statistics are dealt with in the same way as those of Great Britain and Ireland, the result works out to nearly the same advantage of the South Australian female; I have taken the years 1874 to 1893. The statistics from 1893 onwards cannot be at all accurately used in this way, because the results of the 1901 census have not yet been published. But for the years 1874 to 1893, that is, for 20 years, the annual deaths from cancer from the age of 25 upwards, per million of persons, distributed in age-groups according to "The English Life Table No. 3, Persons," are—males 1213, and females 1247; these are nearly equal numbers, and show that in South Australia women are but very slightly more liable to cancer than men.

During these 20 years the males in the population have outnumbered the females, but the census returns of 1901 show a larger proportion of females than males in the living population; but we see that, whether the last seven years are included in our calculations, or are left out, the results come out nearly the same, and testify to a very marked freedom from cancer among the females of South Australia compared with those of the Old Country.

This second outcome of our statistical investigation is very curious, and opens up a very wide field for speculation.

Progressively Increasing Mortality.

During the period of 27 years there has been a fairly steady increase in the number of deaths registered. Our community being small, there is a considerable variation from year to year; but when quinquennial periods are dealt with, this variation disappears. Thus, in successive quinquennia, from 1874 onwards, the average numbers of deaths yearly were 28, 43, 53, 79, 94, males, and 33, 38, 55, 68, 83, females, or 61, 81, 108, 147, 177 persons. In the 25 years the deaths have multiplied about three times, and in the first 20 years $2\frac{1}{2}$ times.

But there has been a very considerable increase in the population, and, with the same rate of mortality from cancer, there must necessarily be an increase in the number of deaths. If we get the ratio of deaths to the population, we shall have a better idea as to the real prevalence of the disease. Taking these quinquennia, and dealing with them in this way, we find the annual mortality rises from 287 per million of population through 293, 364, 467, to 499 in 1894-98.

This reduces the apparent increase for the first 20 years from $2\frac{1}{2}$ times to $1\frac{3}{4}$ times. Still, this is a very great rise, and needs some further explanation, which we will seek to give a little later.

Increased Liability to Cancer with Advancing Age.

Our statistics correspond with those of other places in demonstrating the natural law of the very rapidly increasing liability to cancer with advancing years. If we take the deaths grouped into decennial age periods this becomes very plain. We find that in the 20 years, 1874-1893, the average rate per million of deaths to population between the ages 25 to 35 is 616; between the ages 35 to 45 it is 2305;

between the ages 45 to 55 it is 6296;
,, ,, ,, 55 to 65 it is 11,211;
,, ,, ,, 65 to 75 it is 15,784;
from 75 upwards it is 16,131.

Speaking broadly, we may say that in each successive decade of life beyond 25 to 35, the death-rate from cancer becomes four times as great, ten times as great, 20 times as great, and 25 times as great. The deaths and population above 75 are so few as to make the statistics somewhat unreliable; but even these show a distinct increase on the previous decade. We are so

accustomed to see cancer in people about the age of 50 as to get the general impression that *that* is the most vulnerable period of life. *Most cases of cancer* do occur just then; but this is because the population rapidly diminishes after that, and so the number of cases gets rapidly smaller, though the liability to the disease continues to grow greater.

Now, this increased liability to cancer with advancing age yields a partial explanation of the increasing rate of mortality from the disease in successive years, for the mean age of our population has been raised. Ours is a young community still, only established some 65 years—not long enough to allow those born here to reach advanced ages. It was also recruited during the first 40 years by a considerable immigration of young people, which tended to keep down the mean age, which might be expected therefore to be comparatively low. But during the past 20 years free immigration has been suspended. and but a slight influx of young subjects has occurred. Hence a rise in the mean age of the population during this later period might be looked for, and seems to have occurred. Unfortunately, the age statistics of the 1901 census are not yet published, and we can only investigate those of 1876, 1881, and 1891. If we take at these three periods of time the total production of 25 years, we find

Those between the ages of—

25 and 35	form	36·0,	39·0,	and 38·3	per cent.	respectively
35 and 45	form	28·0,	27·0,	and 25·0	,,	,,
45 and 55	form	19·0,	18·0,	and 17·2	,,	,,
55 and 65	form	11·0,	10·2,	and 11·3	,,	,,
65 and 75	form	4·6,	4·6,	and 6·0	,,	,,

Those above the age of—

75	form	1·5,	1·5,	and 2·2	,,	,,

Those below the age of 55 constitute 83. 84, and 80·5 per cent. respectively; those above the age of 55 constitute 17. 16·3, and 19·5 per cent. respectively; showing that the population in 1891 had a higher mean age than in either 1876 or 1881. Since cancer becomes so very much more common with advancing years, this rise in the mean age, although it may seem but slight, may be a considerable factor in producing the progressively increasing mortality from cancer.

To determine what is the exact influence of this factor, we calculate what would be the number of deaths during the quinquennial periods 1874-'78, '79-'83. '84-'88, '89-'93, for the ages above 25, distributed in groups according to "The English Life Table No. 3, Persons." This eliminates the discrepancy caused by the rise in the mean age of the population. The results for the consecutive quinquennia work out as 2051, 2101, 2545, and 3143, instead of 293, 364, 467, and 499, and give an increase during the 20 years of 53 per cent., instead of 70 per cent. The greater age, therefore, of our population may be regarded as explaining away about one-fourth of the apparent increase in our cancer mortality.

In older and larger, and less fluctuating communities, such as those of Great Britain, this consideration does not weigh very much, if at all; but in a small and unstable population like our own it has to be reckoned with; and we see that it does explain away some of the apparent increase in the cancer mortality.

The three striking results, then, of an analysis of our statistics are:—

I. Our mortality is less than that of England and Wales, being about 82 per cent. of it.

II. Our mortality is progressively increasing, having risen more than 50 per cent. in 20 years.

III. Our mortality is equal in men and women, whereas in the Old Country it is about 50 per cent. greater in the latter than in the former.

Can we offer any explanation of the above?

I.—Our Low Death-rate compared with that of Great Britain and Ireland.

In this computation the higher mean age of the population of the Old Country contrasted with our own has already been allowed for. The suggestion was made, in a discussion at the Institute of Actuaries last year on the Increase of Cancer, that the lower death-rate is only apparent, and is due to a less complete and accurate certification of deaths from cancer. The mortality returns do not show how many persons have died of this disease, but how many certificates of death from cancer have been received at the Registrar's office. Many persons may have died of it whose certificates do not indicate it, and who are consequently not registered under death from cancer.

This may arise from many causes:—

1. As a matter of expediency—for the sake of the relatives—
   (*a*.) It is regarded as an hereditary disease by insurance companies, and a registered certificate of the death of a parent from cancer loads a proponent, and means a heavier premium. Relatives, therefore, prefer an indefinite certificate, such as disease of the stomach or jaundice.
   (*b*.) It is considered hereditary by the people, and so, to soothe their feelings, and lessen their apprehensions in regard to their future, the certificate which is given to them may omit this disquieting term, and debility, marasmus, &c., may be substituted.
   (*c*.) A diagnosis of cancer is not communicated during life unless it is almost certain, for it is esteemed a diagnosis of despair, and generally equivalent to a death-warrant; it is an irrevocable diagnosis from which there is no retreat in case of improvement; it is often a diagnosis of dismissal in favour of some less competent and less candid practitioner; and the modified diagnosis may be maintained in the death-certificate.
2. In consequence of ignorance—

   Many cases of cancer declare their nature to the most inexperienced layman; but others cannot be diagnosed with certainty even by the most acute and experienced clinician. If the patient should die without an exploratory incision, or an operation, or there should be no *post-mortem* examination, it may be impossible to determine the existence of carcinoma, and there may be no more than a suspicion of the disease. Under these circumstances there is no justification for a certificate of cancer. The registered cause may be hæmatemesis, or anæmia, or some other indefinite complaint. If this is the case where a patient has the fullest attention of the most capable diagnosticians in capital cities, how much more frequently must it happen when the patient, isolated in the country, can only obtain an occasional or solitary consultation with medical men, or when he is denied even this, and the Registrar has to be satisfied with a certificate from some Justice of the Peace, or a Police Trooper, whose knowledge of disease cannot be expected

to attain the level of his acquaintance with the law. It is easy to understand, therefore, how the more scattered a population is the less medical attendance can patients obtain; and so the more scattered a population, the fewer cases of cancer will be registered, and the greater the number of deaths from such complaints as dropsy, jaundice, &c. As our 350,000 inhabitants are scattered over so many thousand square miles, we can scarcely expect such accurate diagnosis as in populous England. with its wealth of medical men. This might explain our comparatively slight freedom; but such an explanation can scarcely be accepted, for though our total cancer mortality is 18 per cent. below that of England and Wales, our male mortality is actually higher, and it is the female mortality which is so low, and these suggestions can scarcely apply to the one sex without applying to the other. And though we have such a large area of country, and so small a population, this is not so scattered as might at first be imagined, for a very large proportion of it is settled in and around the capital and the chief towns and townships, and the rank and file of the profession in them is, in my opinion, of as high a standard as in the Old Country. In reference to our male mortality, there is nothing to explain. What does need elucidation is the marked freedom of our women from cancer.

II.—Our Progressively Increasing Death-rate, which has Risen 50 per cent. during 20 years.

Although this sounds rather alarming, there probably is little cause for apprehension, for so many reasons can be given for an apparent increase without much actual increase. We have seen how the expansion of the population explains much of it, and how the rising of the mean age explains more. Other very potent factors are:—

(*a*.) Improved Certification.—There is a growing feeling in the profession as to the advantage, scientifically, of correct and exact registration.

(*b*.) More Numerous Medical Men.—These are planting themselves in the different townships in the State, and where three or four of these were formerly worked by one doctor, now each one has a doctor of its own. who can give more time and attention to his patients, and who feels and shows the personal benefit of a competition which arises from the proximity of fellow-practitioners.

(*c*.) More Accurate Diagnosis.—Without question, every decade makes medical men more capable of finding out the nature of maladies with which they are dealing. Their means of investigation are more numerous, and their diagnostic generalisations are more exact. Then, again, the growing frequency of exploratory incisions year by year clears up many a doubtful case. The possibility of undertaking operations for the relief of cases is a further aid. For instance, an elderly man was affected with a somewhat rapidly advancing obstruction of the bowels. Examination externally of the abdomen, and internally per rectum, revealed no organic cause. There was a remote history of tropical dysentery. He grew so bad from abdominal distension, &c., that a right inguinal colotomy had to be performed. Nearly two years afterwards a lump could be felt in the left extremity of his transverse colon, and an ulcerating mass about three inches up the rectum. Had

he died without operation, or had he died under it, his certificate would have been "Obstruction of the Bowels." But a successful operation allowed time for the development of his organic disease, and now, when he passes away, he will be registered as "Cancer of the Intestines." This is one of many cases in which cancerous disease is revealed by palliative operations, which, some 20 or 30 years ago, would not have been performed, or would most likely have proved fatal. So, too, with *post-mortem* examinations. How many cases of cancer are there which without an autopsy could not be certified as such? They live and die with the disease unsuspected occasionally, only a speculation sometimes—often it is no more than a strong probability. The greater frequency of *post-mortem* examinations explains to some extent the greater number of registered deaths from cancer.

Of course, it is impossible to determine what part of the apparent increase in the mortality from cancer is to be attributed to the above causes, and it is therefore idle to speculate as to other agencies in the production of what may be non-existent.

III.—The Very Low Death-rate Among Women.

This is a very peculiar feature of our statistics. In Frankfort-on-the-Main the mortality statistics are probably more accurate, and more correctly kept than anywhere else, and they show cancer mortality in women to be 50 per cent. higher than in men. In Great Britain and Ireland it is 45 per cent. higher. What does this very low female mortality in South Australia mean?

(*a*.) It does not mean a lower average age, because it is manifest when the variation due to age has been eliminated by the use of the age-groups of "The English Life Table No. 3."

(*b*.) It cannot mean that, although cancer is diagnosed as frequently in women as men, the certificates are not only incorrectly filled in as often as in men, but to a further extent of 33 per cent. of the whole. One cannot conceive of any sufficient motive for such a course of procedure.

(*c*.) It cannot mean that the disease is not so frequently or so easily diagnosed in women as in men. This is a most unlikely explanation, for the following reason:—Cancer may occur in parts easily "accessible," such as the breast, vagina, uterus, ovaries, or in the more "inaccessible" places. such as the brain, the œsophagus, stomach, intestines, liver, and pancreas. Now, the Frankfort statistics show that women and men suffer equally from "inaccessible" cancer, and that the extra 50 per cent. of mortality in women is due to "accessible" cancer. But "accessible" cancer is that which is quite easy to diagnose; therefore, one-third of the cancer in women is readily recognised. The cancer which is difficult to detect is just as common in men as in women, and is no easier to diagnose in them. So that, looking at cancer as a whole. in an equal number of cases in men and women. three cases in the latter ought to be detected for every two in the former, and this disparity should appear in the returns: but it does not. And so the conclusion is forced upon us that South Australian women do enjoy a very decided immunity from cancer when compared with their sisters on the other side of the world

THE CAUSES OF THE INCREASE OR ALLEGED INCREASE IN CANCER, EXAMINED IN THE LIGHT OF THE STATISTICS OF NEW SOUTH WALES, SINCE 1856.

BY

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I propose to discuss this question of the increase of cancer entirely from a statistical point of view, and to limit my observations to the statistics of New South Wales. Statistics of the other States are, of course, open for me to draw upon, but the close attention I have given to my own statistics leads me to hesitate using the earlier figures of the other States, until I am certain they have been subjected to the same process of examination that has been applied to the death registrations of New South Wales. For the purposes of this paper, I have examined, or caused to be examined, the registrations of deaths from cancer, as well as those from all ill-defined causes, and from such diseases as probably might have been cancer, though otherwise described. Where the cause of death was obviously cancer, a change was made in the records, but no change of any kind was ventured upon except under the advice of a qualified person. A good many cases were referred to Dr. Tidswell, of Sydney, but, as Dr. Tidswell's advice was not always available, resort was had to other qualified persons. The number of deaths ascribed in this paper to cancer considerably exceeds that set down in former reports on the vital statistics of New South Wales; indeed, alterations have been made in all years except the last three.

The investigation naturally divides itself into two parts: First, has there been a real increase of cancer; and second, if there has been such increase, do the vital statistics of New South Wales bear out any of the reasons assigned by various eminent authorities for that increase.

As regards the alleged increase of cancer, there has been much controversy, and the case against the increase of the disease is ably put by Mr. George King and Dr. Arthur Newsholme, in a paper published in the transactions of the Royal Society of England, May, 1893. The conclusions arrived at by the writers are summarised in the three following propositions, which are given in the words of the writers:—

1. Males and females suffer equally from cancer in those parts of the body common to man and woman, the greater prevalence of cancer among females being entirely due to cancer of the sexual organs, viz., the mamma, ovaries, uterus, and vagina. This is shown by the Frankfort statistics, and may not unreasonably be accepted as a probable general law, seeing that in other respects, where comparison is possible, the Frankfort statistics are confirmed by those of the United Kingdom.

2. The apparent increase of cancer is confined to what we have called "inaccessible" cancer. This is shown (*a*) by the Frankfort statistics; (*b*) by the fact that the difference between the rates for males and females respectively is approximately constant, and does not progressively increase with the apparent increase in cancer in each of the sexes; (*c*) because the apparent increase in cancer among the well-to-do assured lives, who are, presumably, attended by medical men of more than average skill, is not so great as among the general population.

3. The increase in cancer is only apparent, and not real, and is due to the improvement in diagnosis and more careful certification of the causes of death. This is shown by the fact that the whole of the increase has taken

place in inaccessible cancer difficult of diagnosis, while accessible cancer easily diagnosed has remained practically stationary.

In the face of such theories and assertions, proposed by well-known authorities, it would be idle to advance to the consideration of the question of causation, until it can be determined whether, as Dr. Newsholme says, the increase has been apparent, and not real. Dr. Newsholme further pressed his views in the cancer number of the *Practitioner*, and it would be convenient to examine the theory of non-increase of the disease in the order of his arguments in his paper in that publication.

First, it is alleged that the increase in the cancer figures is due to an alteration in the age constitution of the people, and to the fallacious mode of referring cancer deaths to the whole population, rather than to the age groups, cancer being mainly a disease of adult ages.

This contention is disposed of by a comparison of the deaths in age groups with the number of persons exposed to risk in those same groups. This I have done for New South Wales, and the statistics unmistakeably show that, taking a term of years for comparison, there has been an increase in the rate in each group.

Secondly, is the increase due to better diagnosis of the inaccessible organs of the body than was attained in past periods? This argument depends upon the assertion that the figures for accessible organs have remained fairly constant, and that the improved knowledge and means of judgment as to the inaccessible parts have given rise to the increased rates.

The New South Wales figures do not support this view. In that State, the increase in the female deaths for 30 years has been, for generatives, from 84 to 136 per million, which is equal to an advance at the rate of 62 per cent. During the same time, in females, cancer of the breast has advanced from 44 to 70 per million, or almost exactly at the same rate.

Amongst males, externals have increased from 83 to 169 per million during 30 years, and amongst females from 58 to 114 per million. Apart from this evidence, the fact remains that in the past ten years, a period during which it is not claimed that any great improvement in diagnosis has taken place, the increase of cancer has been very considerable for both sexes, and for all ages, the only exception being for females in the age group, 25-34. In this group there has been a slight decline in the number of deaths compared with the population.

Improved diagnosis does not, therefore, account for the increase of the cancer figures.

It will be convenient at this stage to give the number of deaths from cancer in New South Wales, arranged in age groups, for each quinquennial period from 1856, when the registration law came into force, until the present time.

CANCER—MORTALITY RATE—QUINQUENNIALLY.

Males.

Year.	Total.	Rate per 10,000 of Population.	0–24. No. of Deaths.	0–24. Rate per 10,000 of Population.	25–34. No. of Deaths.	25–34. Rate per 10,000 of Population.	35–44. No. of Deaths.	35–44. Rate per 10,000 of Population.	45–54. No. of Deaths.	45–54. Rate per 10,000 of Population.	55–64. No. of Deaths.	55–64. Rate per 10,000 of Population.	65–74. No. of Deaths.	65–74. Rate per 10,000 of Population.	75–84. No. of Deaths.	75–84. Rate per 10,000 of Population.	85 +. No. of Deaths.	85 +. Rate per 10,000 of Population.
1856–60.........	133	1·55789	5	·11094	2	·12631	23	1·95515	43	5·50174	36	11·16348	15	13·11074	6	15·60874	3	21·70767
1861-65.........	196	1·83545	8	·13902	9	·45608	26	1·93100	53	5·73456	53	11·28956	31	19·06871	13	34·88060	3	27·05140
1866-70.........	315	2·50462	10	·14582	14	·63865	43	2·67562	82	8·01485	76	12·97127	62	26·05370	24	43·47039	4	22·48454
1871–75.........	513	3·40051	10	·12048	21	·83554	51	2·65281	105	8·65187	151	21·29971	121	37·39762	47	59·88787	7	27·42947
1876–80.........	623	3·38110	13	·12727	24	·80172	71	3·07898	137	8·78549	186	22·99220	134	33·12322	51	47·66355	7	21·87500
1881–85.........	742	3·30701	19	·15347	24	·64270	85	3·07632	174	9·10066	178	18·16289	182	37·33410	74	52·21564	6	15·45595
1886–90.........	1132	4·12017	31	·20693	45	·91754	129	3·90304	273	12·29885	333	26·16444	227	40·27894	80	44·00440	14	30·36218
1891–95.........	1618	5·11233	63	·36887	55	·97290	146	3·75079	353	13·99145	493	31·96235	362	52·60787	127	57·42968	19	38·29873
1896–1900......	1946	5·70260	44	·24021	55	·98534	188	4·17694	359	12·81552	584	33·82272	504	56·22991	182	71·89129	30	63·10475
Total......	7218	3·98807	203	·20632	249	·79989	762	3·33918	1579	10·55635	2090	24·82899	1638	42·23239	604	54·20833	93	32·94368

Females.

Year.	Total.	Rate per 10,000 of Population.	0–24. No. of Deaths.	0–24. Rate per 10,000 of Population.	25–34. No. of Deaths.	25–34. Rate per 10,000 of Population.	35–44. No. of Deaths.	35–44. Rate per 10,000 of Population.	45–54. No. of Deaths.	45–54. Rate per 10,000 of Population.	55–64. No. of Deaths.	55–64. Rate per 10,000 of Population.	65–74. No. of Deaths.	65–74. Rate per 10,000 of Population.	75–84. No. of Deaths.	75–84. Rate per 10,000 of Population.	85 +. No. of Deaths.	85 +. Rate per 10,000 of Population.
1856–60.........	105	1·57412	5	·11471	10	·95158	28	4·00744	32	8·89135	20	14·54651	7	14·94449	2	13·00390	1	39·06250
1861–65.........	163	1·95130	11	·20233	8	·61303	46	5·63967	57	11·52097	22	10·49518	16	23·23893	2	10·72368	1	22·57336
1866–70.........	261	2·55174	9	·13611	13	·82300	48	4·91904	77	12·50284	66	21·21442	37	34·64419	10	42·66212	1	14·18440
1871 75.........	388	3·10347	7	·08688	24	1·28122	78	6·50971	121	16·01482	103	24·87682	45	28·29477	9	26·87369	1	8·53971
1876–80.........	437	2·86406	10	·10164	32	1·47436	103	6·80304	110	12·04450	110	21·20891	50	22·04877	21	38·39125	1	4·73709
1881–85.........	610	3·26792	16	·13441	37	1·37725	111	5·95177	184	16·13837	134	20·66657	97	31·75850	30	35·91954	1	2·97530
1886-90.........	912	3·93890	25	·17239	60	1·67327	134	6·00843	249	16·89418	242	29·91939	138	35·70689	56	47·26935	8	16·75393
1891–95.........	1255	4·60181	38	·22812	53	1·20322	202	7·47619	316	17·55458	352	35·07583	196	39·94294	90	56·81459	8	14·67890
1896–1900......	1657	5·44759	36	·19982	72	1·46565	234	7·04511	393	19·08916	442	35·74895	313	49·87015	146	73·59241	21	45·89161
Total......	5788	3·79488	157	·16460	309	1·31106	984	6·42258	1539	16·01087	1491	28·21315	899	37·17119	366	51·95543	43	18·82003

The table just given shows that, when every possible allowance is made for improvement in diagnosis, it is evident that there has been a real increase in cancer. It is true that there has been some unsteadiness in the rates of increase, an unsteadiness largely due to the smallness of the numbers open to risk in some years, but the tendency of the fatalities from the disease to increase is unmistakeable in each age group, the only particle of hope to be extracted from the figures being the possibility that, for ages up to 65 years, the maximum fatality has apparently been reached. In the arguments in favour of improved diagnosis, stress is laid upon the alleged fact, that the increase has been wholly or mainly in internal or inaccessible cancer. The incorrectness of this view has already been pointed out, but to make it more plain the following table has been prepared, showing for males and females the death-rates from cancer per 10,000 persons in each five-year period since the records were first kept, specifying whether the part affected was external or internal. For sake of convenience, the parts affected have been classed as externals and internals, according as they were accessible or not. In Appendices D and E these Classes are again divided according to the principal organs subject to the disease. In these tables the columns headed "unspecified" relate to cases where the parts affected were not specified, the actual cause of death being otherwise correctly set down. Distributing the unspecified in the table now given, rateably between the externals and internals, the rates stand as follows:—

Annual Death-rate from Cancer per 10,000 Persons Living, showing Parts affected.

	Externals.		Internals.	
Period.	*Males.*	*Females.*	*Males.*	*Females.*
1856–60	0·70	0·51	0·85	1·04
1861–65	0·97	0·69	0·89	1·26
1866–70	1·16	0·73	1·36	1·83
1871–75	1·37	0·81	2·03	2·20
1876–80	1 34	0·81	2·04	2·12
1881–85	1·22	0·70	2·11	2·58
1886–90	1·52	0·90	2·60	3·02
1891–95	1·55	0·97	3·58	3·64
1896–1900	1·81	1·21	3·87	4·27

It will be seen that internal causes have increased faster than external, and this by itself might favour the theory that improved diagnosis would account for the increase in the cancer rates. The most, however, that can be claimed is that improved diagnosis accounts for part of the increase. It will be conceded that the increase in external cancer figures is not due to improved diagnosis, yet from 1876-80 there was an increase in the rates for males of 35 per cent., and amongst females of 50 per cent. Applying these percentages to the rates for internal cancer, the figures for males in 1896-1900 would be 2·75 per 10,000, compared with 3·87 actually recorded. Similarly, for females the figures would be 3·18 per 10,000, compared with the actual rate of 4·27. Thus, of the whole increase during 20 years (1876-80 to 1896-1900), viz., 2·30 per 10,000 for males, and 2·55 for females, only 1·12 for males and 1·09 per 10,000 for females, that is to say, in the first case one half and in the second two-fifths, can be set down as due to improved diagnosis. But even this conclusion is open to question. The period 1876-80 has been taken as the starting-point of comparison because the anterior years, though useful as illustrations, are better avoided for exact comparisons, owing to the smallness of the population open to risk, and because, during a large part of the time elapsing since 1880, it cannot be claimed that the art of diagnosis has made very special advance.

I shall now give figures showing the relative increase in cancer since 1876; in making the computations I have assumed the age constitution

of the population remained the same throughout the 25 years. The rates per 10,000 were—

Period.	*Males.*	*Females.*
1876-80	3 ·38	2 ·93
1881-85	3 ·29	3 ·13
1886-90	4 ·13	3 ·69
1891-95...	4 ·98	4 ·12
1896-1900	5 ·15	4 ·47

It may be now safely assumed that there has been a real increase in cancer, even if a liberal allowance be made for improved diagnosis, and I am, therefore, free to examine the theories that have been advanced as explaining the reasons for such increase, confining myself, of course, to such theories as are susceptible of test by statistical methods.

The first of these theories in regard to the causation of cancer rests on the assumption that there is a certain geographical distribution of the disease. It is asserted that there is an analogy between cancer and malarial diseases, and that both seem to bear a relation to a marshy soil. Much discussion has been given to the alleged fact that the chief cancer fields are along the course of seasonably-flooded rivers. Haviland's statistics give great prominence to the facts bearing upon this point, and W. Roger Williams writes much in favour of the theory in his book on the "Diseases of the Breast" (1894). The 47th report of the Registrar-General of England, however, shows that low-lying flooded districts have not a remarkable cancer rate. Under any circumstances, the theory, if true, would only partially account for cancer increase. No very large proportion of the population of England lives in districts answering to the description of flooded districts. As for Australia, the area is extremely limited which could be said to be seasonably flooded. In New South Wales all the rivers are liable to floods, but there is no regularity in the occurrence of the floods. Indeed, though the water may escape the banks for two or three years in succession, on the other hand a dozen years may go by without a flood taking place. However, taking the deaths from cancer in the districts liable to inundation, I cannot find that their number, compared with the population, differs from that of the remainder of the State. Apart from this, it is certain that cancer has greatly increased in districts which are the reverse of marshy; where the thirsty soil does not receive more than 15 to 18 inches of rainfall during an average year.

The second theory is that of cancer houses. The question of cancer houses has been dealt with by Haviland, Darcy Power, Law-Webb, and in the *Practitioner*. There is much to be said in favour of the serious investigation of this matter. The English statistics are certainly remarkable, but, at most, they show that cancer is possibly a parasitic disease. The existence of cancer houses does not account for the great increase in the cancer rates, though it may account for the continued existence of the disease, in any circumstance the theory does not explain the great increase in New South Wales. There the increase has not been confined to old settled areas. On the contrary, it has been noticeable in districts newly settled, and presenting features absolutely opposite to those in regard to which the English observations have been reported. Indeed, in all the Australian States it is found that cancer has thriven where the rude houses of the pioneer can, by no possible chance, have had a cancer history.

In his address, a few years ago, Sir William Banks advanced very confidently, the theory that the increased consumption of food and drink had much to do with the increase of cancer. The foods Sir William Banks had in view were animal foods of a stimulating kind, and the drinks alcoholic beverages. In England, the consumption of animal food has largely increased of recent years, but, as I am discussing the matter from an Australian point

of view, I shall confine my illustrations to Australia. The statistics show that in New South Wales there has been a decided decrease in the quantity of meat consumed per head of population, while the decrease in the consumption of stimulants has been singularly great. There can be no question that too much meat is still eaten in Australia, but, as regards alcohol, we compare very favourably with any other people of European race.

In regard to the question of heredity, the Australian statistics give no aid. The records extend no further back than 45 years, and in such a period there is little opportunity for the discovery of hereditary taint. In any circumstances, the fact that parent and child have succumbed to the same disease, does not prove that the disease is hereditary. Amongst elderly people cancer is so common that many persons in succeeding generations might develop the disease, without any necessary correlation of cause and effect. The strongest answer to the theory of heredity is the fact that the cancer rate is increasing faster than the population rate, and if cancer were merely transmitted from parent to offspring its rate of increase would not exceed that of the population, unless, indeed, cancerous persons are more fecund than the rest of the population, which the New South Wales statistics show is not the case.

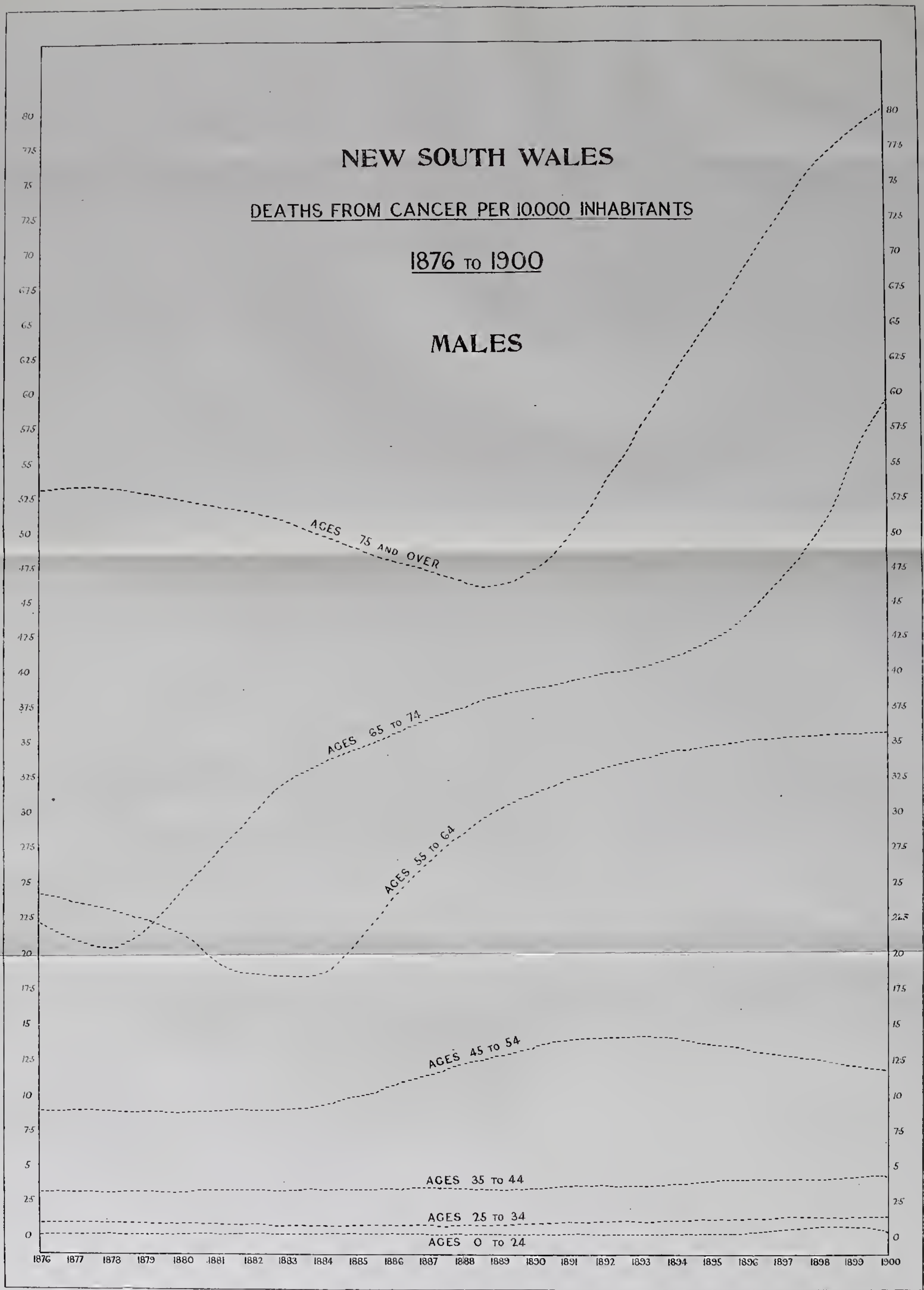
The question of the spread of cancer due to traumatism is one upon which statistics can throw no light. There are no statistics of blows received; and to assume that the increase of cancer is due to blows is to assume that people are more subject to blows now than formerly. Of this, of course, there is no evidence; but the prevalence or non-prevalence of fatal accidents may be taken as having some possible bearing upon the question of blows. Where accidents are numerous, it may be assumed that occupations are dangerous, and, perhaps, non-fatal blows are more numerous than when accidents are rarer. Upon the prevalence of accidents statistics throw a good deal of light. Accidents are still very numerous in Australia, but the number that prove fatal is proportionately less than was formerly the case. Such evidence as accidents give is therefore against the theory of traumatism.

The next question to be considered involves more intricate examination of the statistics than any other. By many it is considered that the saving of life from the earlier ages gives an increased constituency in the older ages from which the increase in the cancer rate is derived. This theory is very plausible, and merits careful consideration, and, unlike some other theories, it is susceptible of being brought to the test of a fairly exact computation.

The question to be considered is: Does the saving of life from the earlier ages, by reason of better sanitary provision, by the advancement of medical science, or however arising, give an increased constituency in the older ages from which the increase in the cancer rate is derived, the supposition being that these saved lives are, somehow or other, more susceptible to cancer than the rest of the population?

Of course, every additional life saved and carried forward provides an additional source from which cancer may be experienced, since the disease is common in less or greater degree to all life stages, but the question to be settled is: Whether all the increase of cancer may be derivable from these saved lives, or whether it is due to greater virulence in the disease itself, or to greater susceptibility on the part of the population, or to increased opportunities for its spread?

In the appended tables, A and B, the hypothetical lives are given in the various age groups, on the supposition that the general mortality rate in 1875, the commencement of the period which I propose to review, had prevailed throughout. The number compared with the actual numbers living gives the salvage population at each later period. The hypothetical cancer deaths are similarly obtained on the supposition that the initial cancer rate had remained constant throughout. The results show salvage population



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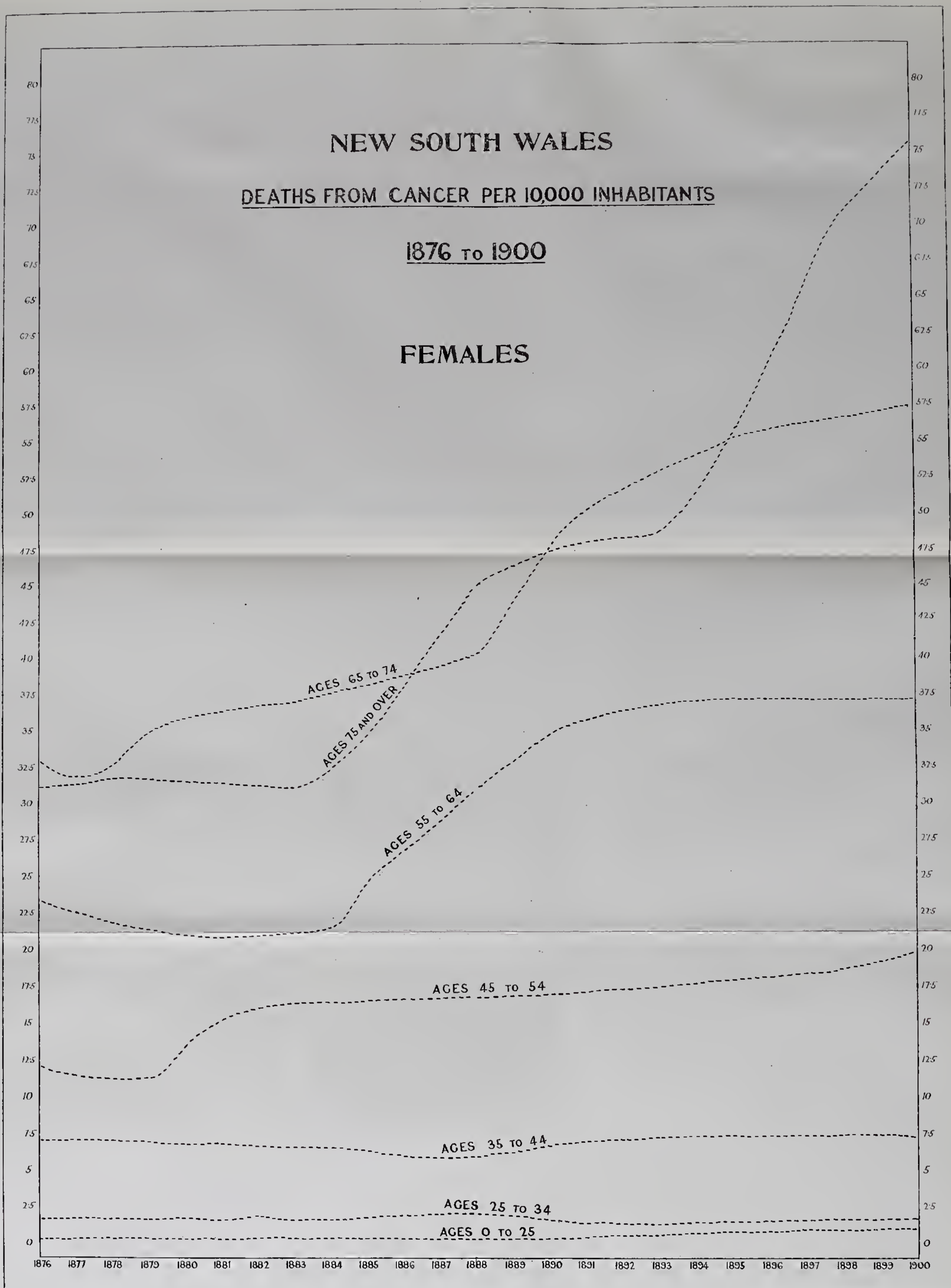

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together with the cancer increase, and relating these numbers we obtain the necessary "salvage cancer rate," if the theory be true that the rate amongst the ordinary population is no greater than formerly, the increase being due to the presence of these salvage lives.

From the main tables, marked A and B in the appendix, the following table has been derived. If on dissecting the results there appears to have been a salvage population, and an increase in the cancer rate, the effect has been marked in the table by the term + s; where there has been no salvage and an increase of cancer the effect is marked + i; where there has been a decrease the effect is marked — i. With these definitions of terms the accompanying table may be understood. It should be noted that all the changes in the table, however marked, can be ascribed to change in the intensity of the cancer mortality (plus or minus); where marked i, intensity must have been the cause of the fluctuation, but where s is given, the result may have been attributable to salvage, but there is the possibiliy of its having been due to changes in intensity also.

MALES.

(*Deduced from Table A.*)

Age Groups.	1876-80.	1881-5.	1886-90.	1891-5.	1896-1900.
0 to 24 ...	normal	+ i	+ s	+ s	+ s
25 to 34 ...	"	— i	+ i	— i	+ s
35 to 44 ...	"	normal	+ s	+ s	+ s
45 to 54 ...	"	+ i	+ i	+ s	+ s
55 to 64 ...	"	— i	+ s	+ s	+ s
65 to 74 ...	"	+ s	+ s	+ s	+ s
75 to end ...	"	+ i	normal	+ s	+ s

FEMALES.

(*Deduced from Table B.*)

0 to 24 ...	normal	+ i	+ s	+ s	+ s
25 to 34 ...	"	— i	+ i	— i	— i
35 to 44 ...	"	— i	— i	+ s	+ s
45 to 54 ...	"	+ i	+ i	+ s	+ s
55 to 64 ...	"	— i	+ s	+ s	+ s
65 to 74 ...	"	+ i	+ s	+ s	+ s
75 to end ...	"	— i	+ s	+ s	+ s

The evidence which the foregoing table affords is entirely inconclusive. The most that can be said in favour of the salvage theory is that the saving of lives has been accompanied by an increase of cancer mortality. Moreover, it should be noted that there has been a considerable increase in cancer even beyond the middle stage, which has been undoubtedly due to intensity alone, and hence there is very considerable room for doubt whether the increase of cancer can be accounted for by means of the theory that the saved persons from one age group provide the persons doomed to cancer in a later period of life. If the latest period be examined (see Tables A and B), it will be seen that the theory of salvage would necessitate the acceptance of the following as the death rates per cent. amongst saved lives in each of the age groups named.—

AGE GROUP.	DEATH RATE PER CENT. *Males.*	DEATH RATE PER CENT. *Females.*
Under 25 years ...	0·18	0·16
25 and under 35 ...	2·33	0·49
35 " " 45 ...	1·68	normal
45 " " 55 ...	8·02	15·27
55 " " 65 ...	8·82	17·45
65 " " 75 ...	12·52	15·25
75 and over	15·58	18·42

These rates are, of course, quite possible, but eminently improbable. What is more probable, is the assumption that the intensity of cancer has increased for all ages, and is more largely exhibited amongst so-called salvage lives than amongst others; but even of this there is only indirect evidence. Salvage lives are of two classes. To one class belong those who are on a plane with ordinary members of the community, but who, in former times, would have fallen victims to neglect or insanitation; to the other belong those who are born delicate, and whose lives have been saved by reason of the medical aid which recent years has placed within the reach of all, by improved sanitary methods, or by the banishing of the many superstitions that formerly surrounded the rearing of children. Many of those whose lives are thus saved never become efficient members of the community. They are weaklings all their days, and are carried through their infancy only to drop off in youth or early manhood.

This leads me to a part of my subject which I approach with diffidence. I desire now to place before you certain statistics which would seem to connect, in some way, the increase of cancer with the decrease of tuberculosis. I have taken out the deaths from cancer and tuberculosis for each year of life during the last 25 years. These have been tabulated in age groups according to the method already indicated, and compared with the number of persons living in the groups. Combining the rates for the two diseases, the results disclosed by the following table are obtained. These rates have been subjected to no adjustment; they represent the actual deaths occurring at each period and in each group, divided by the total number of persons belonging to that group.

Deaths from Cancer and Tuberculosis in Age Groups per 1000 of the Population in each Group.—Males.

Age groups.	1876-80.	1881-85	1886-90.	1891-95.	1896-1900.
0 to 24	1·01	1·13	1·12	0·88	0·68
25 to 34	1·85	2·28	2·23	1·90	1·63
35 to 44	2·46	2·86	2·51	2·41	2·26
45 to 54	3·26	3·56	3·55	3·59	3·20
55 to 64	4·67	3·70	4·74	5.51	5·73
65 to 74	4·60	5·21	6·07	7·14	7·36
75 upwards ..	5·32	5·15	4·65	5·76	7·62

Deaths from Cancer and Tuberculosis in Age Groups, per 1000 of the Population in each Group.—Females.

Age groups.	1876-80.	1881-85.	1886-90.	1891-95.	1896-1900.
0 to 24	0·96	1·09	1·04	0·76	0·69
25 to 34	1·99	2·21	2·07	1·73	1·50
35 to 44	2·77	2·66	2·27	2·21	2·15
45 to 54	2·98	3·41	3·34	2·94	2·98
55 to 64	3·76	3·45	4·24	4·80	4·73
65 to 74	3·40	3·96	4·74	4·84	5·90
75 upwards ...	3·17	3·16	4·51	4·88	7·04

It will be apparent that the resultant rates in each age group have strikingly constant values, and the fact that they are related to the same standard of observation removes any suspicion that they are the result of accident, for a different distribution of population would produce like results. The question therefore naturally presents itself, whether persons who, under the conditions of life and of medical science in 1876, would have fallen a prey to tuberculosis, but did not, have not at a later period provided some of the material from which our cancer rate has been recruited. I believe it is a medical axiom, that "the morbid diathesis is necessary for the disease weeds

to spread." Then, may not the morbid condition, under which in former years phthisis was produced, have supplied the conditions under which cancer might, and does, flourish. In other words, are cancer and tuberculosis to be considered as complementary diseases?

If the tables of rates be carefully examined, it will be found that—

(*a*) The rates for each age group are remarkably regular during the 25 years, departing no more from the average of the period than death rates are ordinarily found to do.

(*b*) The rates for males are, for all periods and all ages, higher than for females.

(*c*) There is a slight tendency for the rates to decline for years below 35; from 35 to 54 years they have been stationary; and above 55 years increasing. These tendencies are not, of course, inconsistent with the regularity already indicated.

(*d*) The rates show a tendency to increase from age to age up to 75 years. For ages above 75 the data are insufficient to enable a definite opinion to be expressed. The probabilities, however, are in favour of the supposition of a decline in the rates as compared with those of the previous period (65-74 years).

(*e*) No other combination of causes of death exemplifies the peculiarities herein noted, and no other causes are complementary of one another, *i.e.*, the increase in one being modified by the decrease in the other, so as to produce a regular rate for each age group.

(*f*) The results brought out by the foregoing table, allowing for the different age composition of the quinquennial periods, would represent death ratios of almost equal intensity, as the following table shows. The age composition for the first period has been adopted as a standard.

DEATH RATES PER 1000 OF THE POPULATION FROM CANCER AND TUBERCULOSIS.

Period.	*Males.*	*Females.*
1876-80	1·795	1·556
1881-85	1·975	1·698
1886-90	1·922	1·652
1891-95	1·848	1·412
1896-1900	1·668	1·356

I do not know that the facts in connection with the rates for cancer and tuberculosis have ever been pointed out before; in any circumstance, they are remarkable.

To beware of coincidences is an axiom which the statistician early learns. In the course of his investigations he meets so many seeming analogies which extended observations prove baseless, that he is instinctively on his guard lest he should accept as true everything having the appearance of truth. The figures I have given cannot reasonably be treated as merely accidental. They cover too wide a field, and are over too extended a period, to be thus lightly brushed aside. The probabilities against the rates being due to mere coincidence are overwhelming. Nevertheless, I do not claim more than that the apparent association of the two diseases, shown by the death rates, should be investigated. The figures cannot be decided upon by a mere *a priori* assumption that the causation of the diseases is entirely dissimilar, and therefore a connection between them is possible. If the death rates moved equally in the same direction, they might be considered as governed by an

exterior cause, but moving, as they do, regularly in opposite directions, some other explanation must be proposed to account for the phenomena.

In concluding I have to acknowledge the great assistance given me by Mr. J. V. Trivett in the work of compiling the tables attached to this paper. Mr. Trivett is a qualified actuary, well versed in vital statistics.

APPENDICES.

A.—Table illustrating Deaths amongst Salvage Lives (Males), to account for Increase in Cancer Rates.

B.—Table illustrating Deaths amongst Salvage Lives (Females), to account for Increase in Cancer Rates.

C.—Deaths from Cancer in Are Groups, 1856-1900 (Males and Females).

D.—Deaths from Cancer arranged according to the Seats of the Disease, 1856-1900 (Males and Females).

E.—Death Rates from Cancer per 10,000 of Population, in Seats of Disease Groups (Males and Females).

F.—Cancer Variations.

Appendix A.

TABLE illustrating Deaths amongst Salvage Lives (Males) to account for Increase in Cancer Rates.

Age Groups.

	0 to 24.			25 to 34.			35 to 44.			45 to 54.			55 to 64.			65 to 74.			75 to end.		
	Population.	Deaths.	Rate per unit.	Population.	Deaths.	Rate per unit.	Population.	Deaths.	Rate per unit.	Population.	Deaths.	Rate per unit.	Population.	Deaths.	Rate per unit.	Population.	Deaths.	Rate per unit.	Population.	Deaths.	Rate per unit.
1876-1880.																					
Actual	1,021,453	13	·0000127	299,355	24	·0000802	230,596	71	·0003079	155,939	137	·0008785	80,897	186	·0022992	40,455	134	·0033123	13,900	58	·0041727
Hypothetical .	1,021,453	13	·0000127	299,355	24	·0000802	230,596	71	·0003079	155,939	137	·0008785	80,897	186	·0022992	40,455	134	·0033123	13,900	58	·0041727
Salvage	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1881-1885.																					
Actual	1,237,991	19	·0000153	373,424	24	·0000643	276,304	85	·0003076	191,195	174	·0009101	98,002	178	·0018163	48,749	182	·0037334	18,054	80	·0044312
Hypothetical .	1,238,086	16	·0000127	373,636	30	·0000802	276,277	85	·0003079	191,276	168	·0008785	97,913	225	·0022992	48,691	161	·0033123	18,047	75	·0041727
Salvage	—95	3	—·03158	—212	—6	·02830	27	..	..	—81	6	—·07444	89	—47	—·52809	58	21	·36207	7	5	·71429
1886-1890.																					
Actual	1,498,118	31	·0000207	490,440	45	·0000918	330,512	129	·0003903	221,972	273	·0012299	127,272	333	·0026164	56,357	227	·0040279	22,791	94	·0041244
Hypothetical .	1,497,131	19	·0000127	490,916	39	·0000802	330,032	102	·0003079	221,984	195	·0008785	126,764	291	·0022992	56,005	186	·0033123	22,570	94	·0041727
Salvage	987	12	·01216	—476	6	—·01261	480	27	·05625	—12	78	—6·5	508	42	·08268	352	41	·11648	221	..	..
1891-1895.																					
Actual	1,707,899	63	·0000369	565,318	55	·0000973	389,251	146	·0003751	252,297	353	·0013991	154,244	493	·0031962	68,811	362	·0052608	27,075	146	·0053924
Hypothetical .	1,703,218	22	·0000127	565,571	45	·0000802	387,728	119	·0003079	251,814	221	·0008785	152,971	352	·0022992	67,887	225	·0033123	26,573	111	·0041727
Salvage	4681	41	·00876	—253	10	—·03953	1523	27	·01773	483	132	·27329	1273	141	·11076	924	137	·14827	502	35	·06972
1896-1900.																					
Actual	1,831,706	44	·0000240	558,184	55	·0000985	450,090	188	·0004177	280,129	359	·0012816	172,665	584	·0033823	89,632	504	·0056230	30,070	212	·0070502
Hypothetical .	1,820,161	23	·0000127	557,755	45	·0000802	447,112	138	·0003079	278,707	245	·0008785	170,488	392	·0022992	87,931	291	·0033123	29,495	123	·0041727
Salvage	11,545	21	·00182	429	10	·02331	2978	50	·01679	1422	114	·08017	2177	192	·08819	1701	213	·12522	575	89	·15478

Appendix B.

TABLE illustrating Deaths amongst Salvage Lives (Females) to account for Increase in Cancer Rates.

Age Groups.

	0 to 24.			25 to 34.			35 to 44.			45 to 54.			55 to 64.			65 to 74.			75 to end.		
	Population.	Deaths.	Rate per unit.	Population.	Deaths.	Rate per unit.	Population.	Deaths.	Rate per unit.	Population.	Deaths.	Rate per unit.	Population.	Deaths.	Rate per unit.	Population.	Deaths.	Rate per unit.	Population.	Deaths.	Rate per unit.
1876-1880.																					
Actual	983,906	10	·0000102	217,044	32	·0001474	151,403	103	·0006803	91,328	110	·0012045	51,865	110	·0021209	22,677	50	·0022049	7581	22	·0029020
Hypothetical .	983,906	10	·0000102	217,044	32	·0001474	151,403	103	·0006803	91,328	110	·0012045	51,865	110	·0021209	22,677	50	·0022049	7581	22	·0029020
Salvage	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1881-1885.																					
Actual	1,190,368	16	·0000134	268,652	37	·0001377	186,499	111	·0005952	114,014	184	·0016138	64,839	134	·0020667	30,543	97	·0031758	11,713	31	·0026466
Hypothetical .	1,190,489	12	·0000102	268,724	40	·0001474	186,483	127	·0006803	114,080	137	·0012045	64,824	137	·0021209	30,524	77	·0022049	11,641	34	·0029020
Salvage	—121	4	—·033058	—72	—3	·04167	16	—16	—1·000	—66	47	—·71212	15	—3	—·2	19	20	1·05263	72	—3	—·04167
1886-1890.																					
Actual	1,450,227	25	·0000172	358,580	60	·0001673	223,020	134	·0006008	147,388	249	·0016894	80,884	242	·0029919	38,648	138	·0035707	16,622	64	·0038503
Hypothetical .	1,449,293	15	·0000102	358,637	53	·0001474	222,750	152	·0006803	147,438	178	·0012045	80,674	171	·0021209	38,490	95	·0022049	16,357	47	·0029020
Salvage	934	10	·010707	— 57	7	—·12281	270	—18	—·06667	—50	71	—1·42	210	71	·33810	158	43	·27215	265	17	·06415
1891-1895.																					
Actual	1,665,788	38	·0000228	440,484	53	·0001203	270,191	202	·0007476	180,010	316	·0017555	100,354	352	·0035076	49,070	196	·0039943	21,291	98	·0046029
Hypothetical..	1,661,152	17	·0000102	440,108	65	·0001474	269,299	183	·0006803	179,704	216	·0012045	99,794	212	·0021209	48,580	117	·0022049	20,838	60	·0029020
Salvage	4636	21	·00453	376	—12	—·03191	892	19	·02130	306	100	·32680	560	140	·25	490	79	·16122	453	38	·08389
1896-1900.																					
Actual	1,801,623	36	·0000200	491,248	72	·0001466	332,145	234	·0007045	205,876	393	·0019089	123,640	442	·0035749	62,763	313	·0049870	24,415	167	·0068401
Hypothetical .	1,790,344	18	·0000102	490,070	72	·0001474	330,318	225	·0006803	204,920	247	·0012045	122,597	260	·0021209	61,668	146	·0022049	23,883	69	·0029020
Salvage	11,279	18	·00160	1178	..	..	1827	9	·00493	956	146	·15272	1043	182	·17450	1095	167	·15251	532	98	·18421

Appendix C.

Deaths from Cancer in Age Groups—1856-1900.

Males.

Period.	Total Deaths.	Ages. 0-4.	5-9.	10-14.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	45-49.	50-54.	55-59.	60-64.	65-69.	70-74.	75-79.	80-84.	85-89.	90-94.	95-99.	100 and over.	Not stated.
1856-60	133	4	...	...	1	...	1	1	13	10	19	23	25	10	9	6	4	2	3	...	...	...	2
1861-65	196	1	...	...	5	2	2	7	5	20	25	27	18	34	17	13	8	5	2	1	...	...	4
1866-70	315	2	1	...	2	5	6	8	18	25	37	45	33	42	38	23	16	8	3	1	...	...	2
1871-75	513	1	3	...	1	5	9	12	21	30	39	66	75	76	63	58	34	13	3	3	...	1*	...
1876-80	623	4	2	1	3	3	6	18	31	50	60	76	87	98	76	57	39	12	4	1	1	1†	3
1881-85	742	6	3	1	4	5	8	16	31	53	72	101	101	75	96	85	43	30	5	1	...	...	6
1886-90	1132	9	7	1	5	9	13	32	57	72	107	166	158	175	117	109	64	16	11	2	1	...	1
1891-95	1618	21	9	7	3	23	15	40	58	88	151	201	221	271	211	150	90	37	15	3	1	...	3
1896-1900 .	1946	10	12	7	8	7	23	32	70	118	148	211	288	296	321	183	114	68	21	7	1	1‡	...
TOTAL...	7218	58	37	17	32	59	83	166	304	456	658	916	1006	1077	948	684	412	191	67	19	4	3	21

* Age 108. † Age 101. ‡ Age 102.

Females.

Period.	Total Deaths.	0-4.	5-9.	10-14.	15-19.	20-24.	25-29.	30-34.	35-39.	40-44.	45-49.	50-54.	55-59.	60-64.	65-69.	70-74.	75-79.	80-84.	85-89.	90-94.	95-99.	100 and over.	Not stated.
1856-60	105	4	...	...	...	1	3	7	14	14	15	17	11	9	6	1	2	...		1	...	...	...
1861-65	163	8	1	...	...	2	5	3	17	29	36	21	10	12	10	6	1	1	...	1	...	...	...
1866-70	261	4	1	...	2	2	3	10	26	22	38	39	43	23	24	12	7	3	1		...	...	1
1871-75	388	3	...	1	1	2	8	16	26	52	54	67	52	51	31	13	7	2	1	...	...	...	1
1876-80	137	4	2	1	2	1	11	21	38	65	47	63	59	51	33	17	14	7	1	...	...	...	...
1881-85	610	6	2	2	3	3	10	27	45	66	98	86	70	63	56	40	23	7	1	...	...	...	2
1886-90	912	4	6	2	4	9	26	34	48	86	122	127	139	103	81	56	38	18	5	3	...	...	1
1891-95	1255	9	8	3	4	14	14	49	92	110	161	155	175	177	119	76	66	24	6	2	...	...	1
1896-1900 .	1657	13	2	6	9	6	22	50	100	134	181	212	214	228	198	115	104	42	17	3	1	...	...
TOTAL...	5788	55	22	15	25	40	102	207	406	578	752	787	773	717	558	336	262	104	32	10	1	...	6

Appendix D.

DEATHS FROM CANCER, ARRANGED ACCORDING TO THE SEATS OF THE DISEASE, 1856-1900.

Period.	Externals.								Internals.									Unspecified.	Total Cases.
	Head.									Digestive.									
	Mouth.	Throat.	Tongue.	Others.	Total Head.	Breast.	Other.	Total External.	Respiratory.	Stomach.	Liver.	Other.	Total Digestive.	Urinary.	Generative.	Other.	Total Internal.		
Males.																			
1856-60	10	6	6	6	28	2	1	31	...	25	6	3	34	1	...	2	37	65	133
1861-65	10	11	15	17	53	1	6	60	4	29	9	10	48	1	2	...	55	81	196
1866-70	26	20	29	20	95	4	5	104	2	76	13	18	107	4	6	2	121	90	315
1871-75	36	23	38	31	128	2	14	144	12	122	25	29	176	13	2	8	211	158	513
1876-80	26	31	39	60	156	2	15	173	13	134	45	44	223	17	9	2	264	186	623
1881-85	42	51	33	56	182	2	17	201	6	185	66	58	309	23	8	3	349	192	742
1886-90	75	122	67	63	327	2	24	353	31	248	134	148	530	27	7	8	603	176	1132
1891-95	98	118	72	91	379	2	36	417	49	423	209	209	841	48	12	9	959	242	1618
1896-1900	140	190	99	98	527	1	60	588	73	514	250	286	1080	54	10	12	1229	129	1946
TOTAL	463	572	398	442	1875	18	178	2071	190	1786	757	805	3348	188	56	46	3828	1319	7218
Females.																			
1856-60	5	3	1	1	10	14	...	24	1	6	1	5	12	...	37	...	50	31	105
1861-65	4	5	2	7	18	26	...	44	...	18	3	8	29	1	46	1	77	42	163
1866-70	3	...	1	5	9	45	5	59	3	33	9	16	58	...	86	2	149	53	261
1871-75	7	4	2	5	18	55	7	80	3	52	18	17	87	3	133	4	230	78	388
1876-80	6	4	2	10	22	50	6	78	3	65	30	16	111	3	115	2	234	125	437
1881-85	9	5	...	10	24	59	9	92	7	87	56	32	175	3	177	2	364	154	610
1886-90	10	9	1	17	37	107	24	168	18	148	95	68	311	6	219	5	559	185	912
1891 95	10	8	8	33	59	147	23	229	22	213	147	110	470	14	355	11	872	154	1255
1896-1900	14	21	5	43	83	212	47	342	27	304	216	211	731	23	415	18	1214	101	1657
TOTAL	68	59	22	131	280	715	121	1116	84	926	575	483	1984	53	1583	45	3749	923	5788

Appendix E.

Death Rates from Cancer per 10,000 of Population in Seat of Disease Groups.

Males.

Period.	Externals. Head: Mouth.	Externals. Head: Throat.	Externals. Head: Tongue.	Externals. Head: Others.	Externals. Breast.	Externals. Other Externals.	Externals. Total Externals.	Internals. Respiratory.	Internals. Stomach.	Internals. Liver.	Internals. Other Digestive.	Internals. Urinary.	Internals. Generative.	Internals. Other Internals.	Internals. Total Internals.	Unspecified.
1856–60...	·12	·07	·07	·07	·02	·01	·36	...	·29	·07	·04	·01	...	·02	·43	·76
1861–65...	·09	·10	·14	·16	...	·06	·55	·04	·28	·08	·09	...	·02	...	·51	·80
1866–70...	·21	·16	·23	·16	·03	·04	·83	·02	·60	·10	·15	·03	·05	.02	·97	·72
1871–75...	·24	·15	·20	·21	·01	·09	·95	·08	·81	·17	·19	·09	·01	.05	1·40	1·05
1876–80...	·14	·17	·21	·33	·01	·08	·94	·07	·73	·24	·24	·09	·05	.01	1·43	1·01
1881–85...	·19	·23	·15	·25	·01	·08	·91	·03	·82	·30	·26	·10	·04	.01	1·56	·86
1886–90...	·27	·44	·24	·23	·01	·09	1·28	·11	·90	·49	·54	·10	·03	.03	2·23	·64
1891–95...	·31	·37	·23	·29	·01	·11	1·32	·16	1·34	·66	·66	·15	·04	.03	3·04	·77
1896–1900	·41	·56	·27	·27	...	·18	1·69	·21	1·60	·73	·84	·16	·03	.04	3·61	·38

Females.

Period.	Externals. Head: Mouth.	Externals. Head: Throat.	Externals. Head: Tongue.	Externals. Head: Others.	Externals. Breast.	Externals. Other Externals.	Externals. Total Externals.	Internals. Respiratory.	Internals. Stomach.	Internals. Liver.	Internals. Other Digestive.	Internals. Urinary.	Internals. Generative.	Internals. Other Internals.	Internals. Total Internals.	Unspecified.
1856–60...	·08	·05	·01	·01	·21	...	·36	·01	·09	·01	·07	...	·55	...	·73	·46
1861–65...	·05	·06	·02	·08	·31	...	·52	...	·22	·04	·10	·01	·55	·01	·93	·50
1866–70...	·03	...	·01	·05	·44	·05	·58	·03	.32	·09	·16	...	·84	·02	1·46	·52
1871–75...	·06	·03	·02	·04	·44	·06	·65	·02	·42	·14	·14	·02	·97	·03	1·74	·62
1876–80...	·04	·03	·02	·07	·33	·04	·53	·02	·43	·20	·11	·02	·77	·02	1·57	·83
1881–85...	·05	·03	...	·06	·32	·05	·50	·04	·47	·30	·17	·02	·95	·01	1·96	·82
1886–90...	·04	·04	...	·07	46	·10	·71	·08	·64	·41	·29	·03	·94	·02	2·41	·80
1891–95...	·04	·03	·03	·12	·54	·09	·85	·08	·78	·54	·40	·05	1·30	·04	3·19	·57
1896–1900	·05	·07	·02	·14	·70	·16	1·14	·09	1·00	·72	·70	·08	1·36	·06	4·01	·33

Appendix F.

Cancer Variations.

Males.

Period.	Total.	Cancer.	Carcinoma.	Epithelioma.	Malignant Disease.	Malignant Growth.	Malignant Tumour.	Other Malignant Forms.	Osteo Sarcoma.	Rodent Ulcer.	Sarcoma.	Scirrhus.	Other Varieties.
1856–60	133	106	7	...	3	...	...	...	...	1	...	9	7
1861–65	196	149	14	...	6	...	5	...	...	1	2	12	7
1866–70	315	238	38	2	7	...	4	...	3	3	...	15	5
1871–75	513	404	37	10	36	1	5	...	4	1	2	7	6
1876–80	623	481	50	8	51	1	7	...	1	7	1	13	3
1881–85	742	575	67	24	41	2	12	1	2	1	5	9	3
1886–90	1132	696	163	64	119	5	12	1	3	6	45	6	12
1891–95	1618	835	271	99	208	8	33	9	6	4	109	19	17
1896–1900	1946	933	409	102	285	48	21	12	4	9	103	11	9
Total	7218	4417	1056	309	756	65	99	23	23	33	267	101	69

Females.

Period.	Total.	Cancer.	Carcinoma.	Epithelioma.	Malignant Disease.	Malignant Growth.	Malignant Tumour.	Other Malignant Forms.	Osteo Sarcoma.	Rodent Ulcer.	Sarcoma.	Scirrhus.	Other Varieties.
1856–60	105	89	9	...	2	...	...	1	...	...	...	4	...
1861–65	163	133	6	...	2	...	4	2	...	...	1	8	7
1866–70	261	190	29	1	18	...	5	...	...	...	...	11	7
1871 75	388	290	44	5	18	...	10	...	...	...	...	15	6
1876–80	437	316	56	8	30	...	8	...	...	2	1	9	7
1881–85	610	417	92	7	32	3	19	...	2	...	11	20	7
1886–90	912	494	210	24	81	11	25	...	1	5	28	26	7
1891–95	1255	583	357	20	140	8	25	3	2	8	59	36	14
1896–1900	1657	721	480	34	225	31	24	4	2	11	91	28	6
Total	5788	3233	1283	99	548	53	120	10	7	26	191	157	61

CANCER RECORDS FROM THE PRINCIPAL HOSPITALS OF VICTORIA.

BY

A. W. FINCH NOYES, F.R.C.S.E.

(Surgeon to Out-Patient, Melbourne Hospital; Surgeon to the Skin Department, Alfred Hospital, Melbourne.)

IN this analysis of 3934 cases of carcinoma and sarcoma, records for the past 20 years have been collected from the principal hospitals of Victoria, including many of those in the country districts, as well as those in the large city areas. Hospitals exist other than those from which the data were taken, but either they had been in existence for only a comparatively short period, or else the records were unobtainable.

Number of Cases.—A glance at the tabulated list of cases will show that the total number from all the hospitals has increased from 126 in 1881 to 270 in 1900. At the Alfred Hospital, for the three years, 1881-3, the total number of cases given is 42; for the last three years of the century, 1898-1900, it is 186. The number of ordinary patients treated at the hospital is now about double that of the earlier period. Taking the same periods at the Melbourne Hospital, the numbers are 150, as against 416; the total number of ordinary cases treated being slightly in excess in the later period.

During the period 1881 to 1900, the population of the State of Victoria has increased from 862,346 to 1,197,206, though whether the number of individuals who have arrived at the carcinoma period of life has increased in like proportion it is impossible to say, since the census returns for the last ten years of this period are not yet complete.

The greater accuracy of diagnosis, helped by the more thorough microscopic examination of doubtful growths, and the greater frequency of *post-mortem* examinations, tend to swell the numbers; many cases, too, are now admitted for surgical treatment which, in the past, would have been turned away as inoperable; but these factors alone cannot wholly account for the increase.

Sex.—The number of males is largely in excess over that of females in the proportion of about two to one, the actual figures being 1269 females, and 2665 males. The fact that there is a special hospital for women in Melbourne, the records from which are not included in the analysis, owing to the earlier data being incomplete, would not very materially alter the ratio. Taking the five years, 1895 to 1900, 55 cases of "malignant disease" were operated on in this hospital, which, on this average, would amount to 220 in 20 years. Add this to the total from the other hospitals, and the ratio of males to females remains approximately two to one.

Organ involved.—The organ affected is given in each case, excepting in a few where the notes do not specify it.

The organ primarily involved is given where possible, but in many instances the primary seat is not stated in the data supplied, reference being given only to some organ secondarily involved, as the lymphatic glands of the neck, or to tissue involved by direct spread from adjacent tissue, as from the lip or cheek, to the maxillary bone.

Occupation.—The occupations are taken from a consecutive series of 3000 cases of cancer, from the country and metropolitan hospitals. In order to obtain an accurate gauge of the susceptibility that might be induced by any given occupation, it would, of course, be necessary to ascertain the actual number of individuals engaged in such occupation in the area from which all

the cancer cases had been collected; and then tables, giving the percentage of those stricken by cancer who follow that occupation, could be compiled, and compared with similar tables for other occupations.

Occupations of 3000 *Patients suffering from Cancer, taken from* 18 *Hospitals in Victoria during* 20 *Years.*

Accountants 4, actors 3, agents 9, artists 3, auctioneer 1, bacon curer 1, bakers 9, barmaid 1, barman 1, basketmaker 1, blacksmiths 25, boarding-house-keepers 4, boat builder 1, boatman 1, boilermakers 2, bookkeeper 1, booksellers 2, bootmakers 39, boundary-riders 4, brewer 1, bricklayers 9, brick-makers 5, broker 1, brushmaker 1, builders 6, bushmen 4, butchers 25, butler 1, cab drivers 6, cabinetmakers 6, canvasser 1, caretakers 7, carpenters 67, carpet planners 3, carriers 5, carters 15, cheesemaker 1, chemists 2, clergyman 1, clerks 40, clickers 2, coachbuilder 1, coach driver 1, coach painter 1, collectors 3, commercial travellers 14, compositors 2, confectioner 1, constables 2, cooks 33, cooper 1, cordial makers 3, dairymen 4, dealers 8, domestic duties 1000, drapers 13, draughtsmen 2, draymen 2, dressmakers 11, drivers 9, drovers 10, engine drivers 19, engine fitter 1, engineers 11, engraver 1, farmers 114, felmonger 1, firemen 9, fishermen 5, fishmonger 1, fitters 4, French polisher 1, fruiterers 2, furrier 1, gangers 2, gardeners 59, gas-stokers 2, glazier 1, governesses 23, greaser 1, greengrocers 12, grocers 4, grooms 19, hairdressers 4, hawkers 10, herdsman 1, horse-trainers 2, ice-cream vendor 1, ink-makers 2, ironfounder 1, iron moulders 5, joiner 1, journalists 7, kitchenmen 2, labourers 617, laundresses 10, lawyer 1, line-repairers 2, machinists 3, mailman 1, mattressmaker 1, matrons 2, messenger 1, midwives 3, millers 2, milliner 1, miners 315, mining manager 1, mining speculator 1, musicians 3, music teachers 3, newsagent 1, nurses 15, organist 1, overseers 3, packer 1, photographer 1, plasterers 7, plumbers 4, porters 5, poulterer 1, presser 1, printers 6, publicans 4, rabbiter 1, rabbit inspector 1, rag-picker 1, railway employés 13, reporter 1, saddlers 7, sailmaker 1, salesmen 4, saleswoman 1, sawyers 5, school boys 8, school girl 1, school teachers 6, seamen 22, seamstresses 13, sheep farmer 1, shepherds 5, shipwrights 3, shoeblack 1, shirtmakers 2, skin-sorters 2, slaters 5, solicitor 1, squatter 1, stationer 1, stewards 3, stone-breaker 1, stonemasons 12, storekeepers 2, storemen 10, surveyors 2, tallow worker 1, tailors 15, tailoresses 5, telegraph operator 1, telephone instrument maker 1, tinsmiths 5, tobacco factory hand 1, tobacconist 1, tram employé 1, upholsterer 1, van-driver 1, vine-dresser 1, vignerons 2, warders 6, waiters 4, waitresses 2, watchmakers 2, watchmen 3, weaver 1, wheelwrights 10, wine merchant 1, wineshop-keeper 1, wood-carvers 2, wood-cutters 2, wood dealers 3, wool classer 1, wool sorter 1.

Cancer Records from the Principal Hospitals of Victoria.

By A. W. Finch Noyes, F.R.C.S.E., Surgeon to Out-Patients, Melbourne Hospital; Surgeon to the Skin Department, Alfred Hospital, Melbourne.

Year 1881.

Hospital.	No. of Cases.	Age Limits.	Sex. F.	Sex. M.	Abdomen.	Bladder.	Brain.	Breast.	Face.	Intestine.	Kidney.	Larynx.	Lip.	Liver.	Lower Extremity, including Buttock and Groin.	Lungs and Pleura.	Lymphatic Glands (when no other organ involved is given)	Maxillary Bones.	Mouth.	Oesophagus.	Orbit, including Eye.	Ovary.	Palate.	Pancreas.	Pelvis.	Penis.
Alfred, Melbourne	14	20-67	8	6	..	..	..	3	..	..	..	..	2	..	..	..	1	1	1	..	..	..	..	..	1	1
Ararat	2	40-50	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Ballarat	16	33-79	6	10	..	..	..	1	1	..	1	..	2	2	1	..	..	..	..	..	..	..	..	..	..	1
Bendigo	23	19-70	10	13	..	..	..	..	..	..	..	..	3	1	1	..	..	1	..	..	..	..	..	..	..	..
Castlemaine	9	41-79	1	8	..	..	..	1	1	..	..	..	6	..	..	..	..	..	..	..	..	..	..	..	..	..
Children's, Melbourne	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Clunes	4	37-43	0	4	..	..	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Echuca	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Heathcote	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kilmore	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kyneton	2	45-66	2	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Maldon	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mansfield	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Melbourne	54	13-66	23	31	1	..	1	11	3	1	..	..	6	1	2	1	1	3	..	1	1	..	..	..	..	..
Stawell	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Swan Hill	1	68	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Warrnambool	1	61	0	1	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
Wood's Point	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	126	..	51	75	1	..	1	17	5	1	1	..	19	5	4	1	3	5	1	1	1	..	..	..	1	2

Hospital.	Peritoneum—Mesentery and Omentum.	Pharynx.	Prostate.	Rectum.	Salivary Glands.	Scalp and Skull.	Scrotum.	Spinal Cord.	Spleen.	Stomach.	Testicle.	Thorax and Mediastinum, including Heart.	Thyroid Gland.	Tongue.	Tonsil.	Trunk.	Upper Extremity, including Shoulder.	Uterus.	Vagina.	Vertebra.	Vulva.	No Organ Specified.
Alfred, Melbourne	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..
Ararat	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1
Ballarat	..	..	..	1	..	..	..	..	..	1	..	..	..	..	..	..	1	4	..	..	..	..
Bendigo	..	..	..	1	..	..	..	..	..	5	..	..	..	2	..	..	..	5	..	..	..	4
Castlemaine	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..
Children's, Melbourne	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Clunes	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..
Echuca	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Heathcote	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kilmore	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kyneton	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
Maldon	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mansfield	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Melbourne	..	..	..	5	..	..	..	..	..	8	..	..	..	6	..	..	..	2	..	..	..	..
Stawell	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Swan Hill	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Warrnambool	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wood's Point	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	..	..	..	9	..	..	..	..	..	15	..	..	..	8	..	..	2	16	..	..	..	7

Type of New Growth stated in Returns received. Carcinoma 93 (including Scirrhus 2, Epithelioma 4); Sarcoma 6; Cancer or Malignant Disease only stated 27.

Year 1882.

Hospital.	No. of Cases.	Age Limits.	Sex. F.	Sex. M.	Abdomen.	Bladder.	Brain.	Breast.	Face.	Intestine.	Kidney.	Larynx.	Lip.	Liver.	Lower Extremity, including Buttock and Groin.	Lungs and Pleura.	Lymphatic Glands (when no other organ involved is given)	Maxillary Bones.	Mouth.	Oesophagus.	Orbit, including Eye.	Ovary.	Palate.	Pancreas.	Pelvis.	Penis.
Alfred, Melbourne	14	24-92	4	10	..	1	..	1	..	1	..	1	..	4	1	..	2	..	..	..	..	1	..	..	..	..
Ararat	6	30-70	0	6	1	..	..	..	1	..	..	..	..	2	1	..	1	..	..	..	..	..	..	..	..	..
Ballarat	25	32-67	6	19	..	..	..	2	2	..	..	..	1	5	..	1	1	1	..	1	..	..	..	..	..	..
Bendigo	16	31-70	6	10	..	..	..	2	..	..	..	..	4	..	1	..	..	..	..	..	..	..	..	..	..	..
Castlemaine	7	52-82	2	5	..	..	1	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
Children's, Melbourne	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..
Clunes	3	47-57	0	3	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..
Echuca	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Heathcote	1	54	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kilmore	1	45	0	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
Kyneton	6	49-73	2	4	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Maldon	1	66	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mansfield	2	29-60	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Melbourne	30	21-82	8	22	1	..	..	1	2	..	..	..	..	3	2	1	3	..	..	1	..	..	..	..	..	..
Stawell	6	49-64	2	4	..	..	..	..	1	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..
Swan Hill	1	52	0	1	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..
Warrnambool	2	64 65	0	2	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..
Wood's Point	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	121	..	31	90	2	1	1	8	6	1	..	2	9	16	5	3	8	1	..	2	..	1	..	1	..	..

Hospital.	Peritoneum—Mesentery and Omentum.	Pharynx.	Prostate.	Rectum.	Salivary Glands.	Scalp and Skull.	Scrotum.	Spinal Cord.	Spleen.	Stomach.	Testicle.	Thorax and Mediastinum, including Heart.	Thyroid Gland.	Tongue.	Tonsil.	Trunk.	Upper Extremity, including Shoulder.	Uterus.	Vagina.	Vertebra.	Vulva.	No Organ Specified.
Alfred, Melbourne	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..
Ararat	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Ballarat	2	1	..	..	..	1	..	..	..	4	..	..	..	1	..	..	..	1	..	..	..	1
Bendigo	..	..	..	..	..	..	..	..	1	4	..	..	..	2	..	..	..	..	..	..	..	2
Castlemaine	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	3
Children's, Melbourne	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Clunes	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Echuca	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Heathcote	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Kilmore	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kyneton	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5
Maldon	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
Mansfield	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
Melbourne	..	..	..	3	..	..	..	..	..	2	..	..	..	5	..	..	..	5	..	..	1	..
Stawell	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	2	..	..	..	..
Swan Hill	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Warrnambool	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wood's Point	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	2	1	..	3	..	1	..	..	1	12	..	..	..	10	..	..	..	9	..	..	1	14

Type of New Growth stated in Returns received. Carcinoma 78 (including Scirrhus 2, Colloid 2, Epithelioma 22, Rodent Ulcer 1); Sarcoma 3; Cancer or Malignant Disease only stated 40.

Cancer Records from the Principal Hospitals of Victoria—*continued.*

By A. W. Finch Noyes, F.R.C.S.E., Surgeon to Out-Patients, Melbourne Hospital; Surgeon to the Skin Department, Alfred Hospital, Melbourne.

Hospital. Year 1883.	No. of Cases.	Age Limits.	Sex. F.	Sex. M.	Abdomen.	Bladder.	Brain.	Breast.	Face.	Intestine.	Kidney.	Larynx.	Lip.	Liver.	Lower Extremity, including Buttock and Groin.	Lungs and Pleura.	Lymphatic Glands (when no other organ involved is given)	Maxillary Bones.	Mouth.	Oesophagus.	Orbit, including Eye.	Ovary.	Palate.	Pancreas.	Pelvis.	Penis.	Peritoneum—Mesentery and Omentum.	Pharynx.	Prostate.	Rectum.	Salivary Glands.	Scalp and Skull.	Scrotum.	Spinal Cord.	Spleen.	Stomach.	Testicle.	Thorax and Mediastinum, including Heart.	Thyroid Gland.	Tongue.	Tonsil.	Trunk.	Upper Extremity, including Shoulder.	Uterus.	Vagina.	Vertebra.	Vulva.	No Organ Specified.
Alfred, Melbourne	14	23-66	6	8	1	..	..	1	..	..	..	1	3	4	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Ararat	4	38-67	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..	2
Ballarat	21	28-78	7	14	..	..	..	1	1	..	..	..	4	2	2	..	1	..	..	..	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..	2	..	1	..	..	..	..	..	4	..	..	..	1
Bendigo	18	35-73	8	10	..	..	..	..	..	..	..	..	4	1	1	..	..	..	..	..	..	..	..	..	..	1	2	..	..	1	..	..	1	..	..	3	..	..	..	..	..	..	..	2	..	..	1	1
Castlemaine	8	50-75	3	5	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	..	..	..	..	..	..	1	..	..	..	3
Children's, Melbourne	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Clunes	2	52-55	1	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..
Echuca	3	47-56	2	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	2	..	..	..	..
Heathcote	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kilmore	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kyneton	5	33-72	1	4	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	..	..	2
Maldon	1	60	1	0	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mansfield	1	70	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Melbourne	66	22-86	34	32	1	1	..	10	4	..	1	..	4	8	1	3	2	..	..	1	..	..	..	2	..	..	..	..	..	3	..	..	..	..	..	3	10	..	..	1	5	..	1	4	..	..	1	..
Stawell	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Swan Hill	1	56	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Warrnambool	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wood's Point	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	144	..	66	78	2	1	..	12	5	..	1	1	16	18	4	3	3	2	..	1	..	..	..	2	..	1	3	..	..	6	..	..	1	..	..	14	10	2	..	2	5	..	1	16	..	..	2	10

Type of New Growth stated in Returns received. Carcinoma 95 (including Scirrhus 7, Encephaloid 2, Epithelioma 22, Rodent Ulcer 4); Sarcoma 2; Cancer or Malignant Disease only stated 47.

Year 1884.	No. of Cases.	Age Limits.	Sex. F.	Sex. M.	Abdomen.	Bladder.	Brain.	Breast.	Face.	Intestine.	Kidney.	Larynx.	Lip.	Liver.	Lower Extremity, including Buttock and Groin.	Lungs and Pleura.	Lymphatic Glands (when no other organ involved is given)	Maxillary Bones.	Mouth.	Oesophagus.	Orbit, including Eye.	Ovary.	Palate.	Pancreas.	Pelvis.	Penis.	Peritoneum—Mesentery and Omentum.	Pharynx.	Prostate.	Rectum.	Salivary Glands.	Scalp and Skull.	Scrotum.	Spinal Cord.	Spleen.	Stomach.	Testicle.	Thorax and Mediastinum, including Heart.	Thyroid Gland.	Tongue.	Tonsil.	Trunk.	Upper Extremity, including Shoulder.	Uterus.	Vagina.	Vertebra.	Vulva.	No Organ Specified.
Alfred, Melbourne	19	22-63	5	14	1	..	..	..	..	..	1	..	6	2	..	..	..	1	..	..	..	..	..	..	1	..	..	..	..	1	..	..	..	..	..	2	..	..	..	..	..	..	..	2	1	..	..	1
Ararat	5	49-77	1	4	..	..	..	..	..	..	..	..	1	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
Ballarat	19	40-76	7	12	..	..	..	3	2	..	..	1	3	1	2	..	1	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	4	..	..	..	..	..	..	..	..	..	..	..	..
Bendigo	30	31-67	5	25	1	..	..	1	1	..	..	..	3	4	1	1	3	2	..	..	..	..	1	1	..	..	..	..	..	1	..	..	..	..	..	5	..	..	..	3	..	..	..	..	..	..	1	1
Castlemaine	6	35-55	1	5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	..	..	3
Children's, Melbourne	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Clunes	8	43-74	3	5	..	..	..	2	..	..	..	..	2	..	..	1	..	1	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Echuca	1	47	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..
Heathcote	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kilmore	1	57	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kyneton	9	44-70	2	7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	6
Maldon	1	65	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mansfield	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Melbourne	58	8-88	25	33	..	..	..	12	4	1	..	..	3	5	4	3	4	..	4	..	..	..	..	..	..	..	2	..	..	1	..	..	..	..	..	4	1	..	..	4	..	..	1	2	1	..	..	..
Stawell	7	24-63	3	4	..	..	..	1	..	..	..	1	1	..	..	..	..	..	1	..	..	1	..	1	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1
Swan Hill	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Warrnambool	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wood's Point	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	164	..	53	111	2	..	..	19	7	1	1	2	19	12	8	5	9	6	5	..	..	1	1	2	2	2	3	1	..	4	..	1	..	..	..	17	1	..	..	7	..	..	1	8	2	..	1	14

Type of New Growth stated in Returns received. Carcinoma 110 (including Scirrhus 13, Colloid 3, Epithelioma 41, Rodent Ulcer 1); Sarcoma 9; Cancer or Malignant Disease only stated 45,

Cancer Records from the Principal Hospitals of Victoria—*continued.*

By A. W. Finch Noyes, F.R.C.S.E., Surgeon to Out-Patients, Melbourne Hospital; Surgeon to the Skin Department, Alfred Hospital, Melbourne.

Hospital. Year 1885.	No. of Cases.	Age Limits.	Sex. F.	Sex. M.	Abdomen.	Bladder.	Brain.	Breast.	Face.	Intestine.	Kidney.	Larynx.	Lip.	Liver.	Lower Extremity, including Buttock and Groin.	Lungs and Pleura.	Lymphatic Glands (when no other organ involved is given)	Maxillary Bones.	Mouth.	Oesophagus.	Orbit, including Eye.	Ovary.	Palate.	Pancreas.	Pelvis.	Penis.	Peritoneum—Mesentery and Omentum.	Pharynx.	Prostate.	Rectum.	Salivary Glands.	Scalp and Skull.	Scrotum.	Spinal Cord.	Spleen.	Stomach.	Testicle.	Thorax and Mediastinum, including Heart.	Thyroid Gland.	Tongue.	Tonsil.	Trunk.	Upper Extremity, including Shoulder.	Uterus.	Vagina.	Vertebra.	Vulva.	No Organ Specified.
Alfred, Melbourne	25	29–75	9	16	1	..	..	4	..	..	..	..	3	2	1	..	1	..	..	..	..	..	..	..	..	1	1	1	..	1	..	..	..	..	..	3	..	..	..	1	..	..	1	1	..	1	..	2
Ararat	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Ballarat	17	39–73	5	12	..	1	..	..	..	..	..	..	7	1	1	..	..	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	3	..	..	..	..	..	..	..	..	..	2	..	..
Bendigo	27	36–69	5	22	..	..	..	2	2	..	..	..	2	1	..	..	2	2	2	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	3	..	..	..	5	..	..	..	4	..	..	..	..
Castlemaine	7	49–65	1	6	..	..	..	..	..	..	1	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	3
Children's, Melbourne	1	3	1	0	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Clunes	6	38–62	0	6	..	..	..	..	2	..	..	..	1	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Echuca	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Heathcote	2	63–69	0	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..
Kilmore	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kyneton	4	52–78	1	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	3
Maldon	1	66	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
Mansfield	1	50	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Melbourne	56	5–72	17	39	..	..	..	4	5	1	2	..	4	8	4	..	3	7	..	1	..	..	..	1	..	1	1	..	..	1	..	..	..	..	..	4	1	..	..	6	..	1	..	1	..	..	..	..
Stawell	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Swan Hill	1	60	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Warrnambool	2	46–68	1	1	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wood's Point	1	61	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
Total	151	..	40	111	1	1	..	10	9	1	4	..	19	13	7	..	8	10	2	1	..	..	..	1	..	4	2	2	..	2	..	..	..	..	..	19	1	..	..	15	..	1	1	6	..	3	..	8

Type of New Growth stated in Returns received. Carcinoma 95 (including Scirrhus 9, Epithelioma 22, Rodent Ulcer 6); Sarcoma 8; Cancer or Malignant Disease only stated 48.

Year 1886.	No. of Cases.	Age Limits.	Sex. F.	Sex. M.	Abdomen.	Bladder.	Brain.	Breast.	Face.	Intestine.	Kidney.	Larynx.	Lip.	Liver.	Lower Extremity, including Buttock and Groin.	Lungs and Pleura.	Lymphatic Glands (when no other organ involved is given)	Maxillary Bones.	Mouth.	Oesophagus.	Orbit, including Eye.	Ovary.	Palate.	Pancreas.	Pelvis.	Penis.	Peritoneum—Mesentery and Omentum.	Pharynx.	Prostate.	Rectum.	Salivary Glands.	Scalp and Skull.	Scrotum.	Spinal Cord.	Spleen.	Stomach.	Testicle.	Thorax and Mediastinum, including Heart.	Thyroid Gland.	Tongue.	Tonsil.	Trunk.	Upper Extremity, including Shoulder.	Uterus.	Vagina.	Vertebra.	Vulva.	No Organ Specified.
Alfred, Melbourne	26	21–65	10	16	..	..	..	4	..	..	1	1	4	3	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	2	..	..	..	..	..	..	1	1	..	..	1	4
Ararat	3	56–74	1	2	..	..	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Ballarat	30	12–70	9	21	..	..	..	4	2	1	..	..	1	4	2	..	2	..	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	9	..	..	..	2	..	..	1	..	..	..	..	..
Bendigo	18	12–73	10	8	2	..	..	3	2	..	..	1	..	1	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	4	..	..	..	1	..	..	..	..
Castlemaine	5	34–82	1	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	3
Children's, Melbourne	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Clunes	1	68	1	0	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Echuca	3	35–70	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	2
Heathcote	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kilmore	1	67	0	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kyneton	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Maldon	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mansfield	1	54	0	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Melbourne	53	17–75	20	33	2	..	..	8	2	1	*1	..	1	3	..	..	4	1	..	1	..	..	..	2	1	..	..	..	..	2	..	1	..	..	..	7	4	..	..	7	..	..	..	5	..	..	..	..
Stawell	4	50–71	3	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	2	..	..	..	..
Swan Hill	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Warrnambool	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wood's Point	2	54–56	0	2	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	147	..	56	91	4	..	..	20	8	3	2	2	7	13	3	..	7	3	..	1	1	1	..	2	1	1	..	..	..	2	2	1	..	..	..	24	4	..	..	14	..	..	2	9	..	..	1	9

Type of New Growth stated in Returns received. Carcinoma 102 (including Scirrhus 9, Epithelioma 27, Rodent Ulcer 3); Sarcoma 12; Cancer or Malignant Disease only stated 33.

* Supra renal only affected.

CANCER RECORDS FROM THE PRINCIPAL HOSPITALS OF VICTORIA—*continued.*

By A. W. FINCH NOYES, F.R.C.S.E., Surgeon to Out-Patients, Melbourne Hospital; Surgeon to the Skin Department, Alfred Hospital, Melbourne.

HOSPITAL.	No. of Cases.	Age Limits.	Sex. F.	Sex. M.	Abdomen.	Bladder.	Brain.	Breast.	Face.	Intestine.	Kidney.	Larynx.	Lip.	Liver.	Lower Extremity, including Buttock and Groin.	Lungs and Pleura.	Lymphatic Glands (when no other organ involved is given)	Maxillary Bones.	Mouth.	Oesophagus.	Orbit, including Eye.	Ovary.	Palate.	Pancreas.	Pelvis.	Penis.	Peritoneum—Mesentery and Omentum.	Pharynx.	Prostate.	Rectum.	Salivary Glands.	Scalp and Skull.	Scrotum.	Spinal Cord.	Spleen.	Stomach.	Testicle.	Thorax and Mediastinum, including Heart.	Thyroid Gland.	Tongue.	Tonsil.	Trunk.	Upper Extremity, including Shoulder.	Uterus.	Vagina.	Vertebra.	Vulva.	No Organ Specified.
YEAR 1887.																																																
Alfred, Melbourne	30	20-65	11	19	1	..	..	2	2	..	1	..	2	2	2	..	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	2	..	1	..	1	..	..	2	3	..	..	..	7
Ararat	2	50-60	0	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	1
Ballarat	17	28-68	5	12	..	1	..	2	..	1	..	..	1	2	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	1	..	..	1	..	..	1	1	..	..	..	..
Bendigo	32	16-72	10	22	..	..	..	2	..	..	..	1	7	4	1	1	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	4	..	..	..	..	..	..	..	5	..	..	..	5
Castlemaine	3	53-73	0	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	1
Children's, Melbourne	1	2	1	0	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Clunes	2	48-70	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Echuca	2	39-60	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	..
Heathcote	1	60	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Kilmore	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kyneton	5	39-67	0	5	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Maldou	1	66	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	1
Mansfield	1	62	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1	..	..	..	..	..
Melbourne	50	16-77	13	37	..	1	..	4	..	1	..	..	3	8	2	..	2	2	1	..	..	..	..	..	..	1	..	1	..	3	..	..	..	..	..	8	1	..	..	7	..	..	3	..	..	2	..	..
Stawell	2	58-60	0	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..
Swan Hill	1	63	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Warrnambool	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wood's Point	1	74	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
Total	151	..	42	109	1	2	..	10	2	2	2	1	13	16	5	2	5	3	1	1	..	..	1	..	2	1	..	1	..	3	..	..	..	..	..	27	3	1	..	12	..	..	7	9	..	3	..	15

Type of New Growth stated in Returns received. Carcinoma 88 (including Scirrhus 11, Epithelioma 33, Rodent Ulcer 1); Sarcoma 16; Cancer or Malignant Disease only stated 47.

HOSPITAL.	No. of Cases.	Age Limits.	Sex. F.	Sex. M.	Abdomen.	Bladder.	Brain.	Breast.	Face.	Intestine.	Kidney.	Larynx.	Lip.	Liver.	Lower Extremity, including Buttock and Groin.	Lungs and Pleura.	Lymphatic Glands (when no other organ involved is given)	Maxillary Bones.	Mouth.	Oesophagus.	Orbit, including Eye.	Ovary.	Palate.	Pancreas.	Pelvis.	Penis.	Peritoneum—Mesentery and Omentum.	Pharynx.	Prostate.	Rectum.	Salivary Glands.	Scalp and Skull.	Scrotum.	Spinal Cord.	Spleen.	Stomach.	Testicle.	Thorax and Mediastinum, including Heart.	Thyroid Gland.	Tongue.	Tonsil.	Trunk.	Upper Extremity, including Shoulder.	Uterus.	Vagina.	Vertebra.	Vulva.	No Organ Specified.
YEAR 1888.																																																
Alfred, Melbourne	34	16-75	15	19	..	..	..	1	..	1	..	1	..	2	2	..	..	1	..	1	..	..	..	1	1	..	1	..	..	..	1	..	..	..	..	6	..	1	..	4	..	..	2	3	..	..	..	5
Ararat	4	45-54	0	4	..	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1
Ballarat	14	5-69	4	10	..	..	..	2	1	..	1	..	..	..	2	..	..	1	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..	..	..	2	..	1	..	1	..	..	..	..	..	1	..	..
Bendigo	18	38-79	8	10	..	..	..	..	2	..	..	..	3	3	1	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	3	..	..	..	1	..	..	..	3	..	..	..	..
Castlemaine	6	53-78	1	5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	5
Children's, Melbourne	1	7	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Clunes	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Echuca	1	58	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..
Heathcote	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kilmore	2	60-65	0	2	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
Kyneton	5	45-68	0	5	..	..	..	..	..	1	1	..	..	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Maldon	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mansfield	1	56	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Melbourne	47	24-73	16	31	..	..	1	8	2	..	1	..	3	2	4	1	2	1	1	1	..	..	..	..	1	..	1	..	..	3	..	..	..	..	..	4	2	..	..	6	..	..	..	3	..	..	..	..
Stawell	4	50-71	0	4	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..
Swan Hill	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Warrnambool	3	24-80	0	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..
Wood's Point	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	140	..	46	94	..	..	1	11	6	3	3	1	8	9	9	1	2	3	1	2	1	..	..	1	2	3	2	..	..	5	1	..	..	..	..	21	2	2	..	14	..	..	2	10	..	1	..	13

Type of New Growth stated in Returns received. Carcinoma 78 (including Scirrhus 8, Epithelioma 31); Sarcoma 14; Cancer or Malignant Disease only stated 48.

Cancer Records from the Principal Hospitals of Victoria—*continued*.

By A. W. Finch Noyes, F.R.C.S.E., Surgeon to Out-Patients, Melbourne Hospital; Surgeon to the Skin Department, Alfred Hospital, Melbourne.

HOSPITAL.	No. of Cases.	Age Limits.	Sex. F.	Sex. M.	Abdomen.	Bladder.	Brain.	Breast.	Face.	Intestine.	Kidney.	Larynx.	Lip.	Liver.	Lower Extremity, including Buttock and Groin.	Lungs and Pleura.	Lymphatic Glands (when no other organ involved is given)	Maxillary Bones.	Mouth.
Year 1889.																			
Alfred, Melbourne	24	25-80	4	20	..	..	..	3	1	..	..	..	7	3	..	..	2	..	..
Ararat	4	45-65	0	4	..	..	..	..	..	1	..	..	..	1	..	..	..	..	..
Ballarat	22	31-71	8	14	..	..	..	1	2	..	1	..	4	3	..	..	..	..	..
Bendigo	18	3-73	6	12	..	..	..	2	2	..	..	1	..	2	3	..	..	..	..
Castlemaine	7	45-65	0	7	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..
Children's, Melbourne	1	6	0	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..
Clunes	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Echuca	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Heathcote	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kilmore	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kyneton	3	55-64	0	3	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..
Maldon	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mansfield	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Melbourne	56	24-74	19	37	..	1	..	7	1	1	2	..	2	6	2	1	2	..	..
Stawell	3	46-71	1	2	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..
Swan Hill	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Warrnambool	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wood's Point	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	138	..	38	100	..	1	..	13	7	2	3	1	14	18	5	1	4	1	..
Year 1890.																			
Alfred, Melbourne	25	20-70	9	16	..	..	..	4	1	..	..	..	..	3	1	..	1	..	1
Ararat	5	49-57	1	4	..	..	..	..	..	1	..	..	..	..	..	..	1	..	..
Ballarat	15	50-80	6	9	..	..	..	3	1	..	..	..	2	3	..	..	..	..	..
Bendigo	25	26-81	6	19	..	..	..	..	2	..	..	2	2	1	3	..	1	2	2
Castlemaine	7	39-77	3	4	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..
Children's, Melbourne	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Clunes	2	50-60	0	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Echuca	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Heathcote	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kilmore	1	43	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kyneton	5	50-71	0	5	..	..	..	..	2	..	..	..	..	..	..	..	..	..	1
Maldon	1	69	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mansfield	2	56-66	0	2	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..
Melbourne	76	4-79	13	63	1	..	..	3	1	1	..	1	5	6	2	..	8	2	1
Stawell	7	45-86	1	6	..	..	..	..	1	..	..	..	1	1	..	..	..	..	..
Swan Hill	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Warrnambool	4	43-70	1	3	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..
Wood's Point	1	..	0	1	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..
Total	176	..	40	136	1	..	..	10	9	2	..	3	12	14	6	..	12	4	5

HOSPITAL.	Oesophagus.	Orbit, including Eye.	Ovary.	Palate.	Pancreas.	Pelvis.	Penis.	Peritoneum—Mesentery and Omentum.	Pharynx.	Prostate.	Rectum.	Salivary Glands.	Scalp and Skull.	Scrotum.	Spinal Cord.	Spleen.
Year 1889.																
Alfred, Melbourne	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Ararat	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Ballarat	1	..	..	..	..	..	..	..	..	..	3	..	..	..	..	..
Bendigo	..	1	..	..	..	..	..	..	1	..	1	..	..	..	..	..
Castlemaine	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..
Children's, Melbourne	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Clunes	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Echuca	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Heathcote	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kilmore	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kyneton	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
Maldon	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mansfield	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Melbourne	2	..	..	..	..	..	2	..	..	..	1	1	1	..	..	..
Stawell	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Swan Hill	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Warrnambool	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wood's Point	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	4	1	..	1	..	..	4	..	2	..	5	1	1	..	..	..
Year 1890.																
Alfred, Melbourne	..	..	..	..	1	1	..	2	..	..	4	..	..	..	..	..
Ararat	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..
Ballarat	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Bendigo	..	..	..	..	..	..	1	..	..	..	1	..	..	..	..	..
Castlemaine	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Children's, Melbourne	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Clunes	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Echuca	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Heathcote	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kilmore	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kyneton	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Maldon	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..
Mansfield	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Melbourne	3	..	..	1	1	1	..	..	..	..	4	..	..	..	..	..
Stawell	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Swan Hill	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Warrnambool	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wood's Point	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	3	..	..	1	2	2	1	2	..	..	11	..	..	..	..	..

HOSPITAL.	Stomach.	Testicle.	Thorax and Mediastinum, including Heart.	Thyroid Gland.	Tongue.	Tonsil.	Trunk.	Upper Extremity, including Shoulder.	Uterus.	Vagina.	Vertebra.	Vulva.	No Organ Specified.
Year 1889.													
Alfred, Melbourne	5	..	..	..	1	..	..	..	..	..	..	..	..
Ararat	1	..	..	..	1	..	..	..	..	..	..	..	..
Ballarat	3	..	1	..	1	..	..	1	1	..	..	..	..
Bendigo	1	..	..	..	2	..	..	..	1	..	..	1	..
Castlemaine	2	..	..	..	..	..	..	..	..	..	..	..	1
Children's, Melbourne	..	..	..	..	..	..	..	..	..	..	..	..	..
Clunes	..	..	..	..	..	..	..	..	..	..	..	..	..
Echuca	..	..	..	..	..	..	..	..	..	..	..	..	..
Heathcote	..	..	..	..	..	..	..	..	..	..	..	..	..
Kilmore	..	..	..	..	..	..	..	..	..	..	..	..	..
Kyneton	..	..	..	..	..	..	..	..	..	..	..	..	..
Maldon	..	..	..	..	..	..	..	..	..	..	..	..	..
Mansfield	..	..	..	..	..	..	..	..	..	..	..	..	..
Melbourne	1	..	..	..	3	..	..	2	6	..	..	..	2
Stawell	..	..	..	..	..	..	..	..	..	..	1	..	..
Swan Hill	..	..	..	..	..	..	..	..	..	..	..	..	..
Warrnambool	..	..	..	..	..	..	..	..	..	..	..	..	..
Wood's Point	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	24	..	1	..	8	..	..	3	8	..	1	1	3
Year 1890.													
Alfred, Melbourne	1	1	..	..	1	..	..	..	2	..	..	..	1
Ararat	1	..	..	..	..	..	..	..	1	..	..	..	..
Ballarat	2	..	..	..	..	..	..	1	2	1	..	..	..
Bendigo	3	..	..	..	..	..	..	..	5	..	..	..	..
Castlemaine	..	..	..	..	..	..	..	..	2	..	..	..	4
Children's, Melbourne	..	..	..	..	..	..	..	..	..	..	..	..	..
Clunes	2	..	..	..	..	..	..	..	..	..	..	..	..
Echuca	..	..	..	..	..	..	..	..	..	..	..	..	..
Heathcote	..	..	..	..	..	..	..	..	..	..	..	..	..
Kilmore	1	..	..	..	2	..	..	..	..	..	..	..	..
Kyneton	..	..	..	..	..	..	..	..	..	..	..	..	..
Maldon	..	..	..	..	..	..	..	..	..	..	..	..	..
Mansfield	..	..	..	..	..	..	..	..	..	..	..	..	1
Melbourne	15	1	1	..	9	..	..	6	3	..	..	..	..
Stawell	3	..	..	..	1	..	..	..	..	..	..	..	..
Swan Hill	..	..	..	..	..	..	..	..	..	..	..	..	..
Warrnambool	1	..	..	..	..	..	..	..	1	..	..	..	1
Wood's Point	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	29	2	1	..	13	..	..	7	16	1	..	..	7

Type of New Growth stated in Returns received, 1889. Carcinoma 82 (including Scirrhus 9, Encephaloid 1, Epithelioma 27); Sarcoma 12; Cancer or Malignant Disease only stated 44.

Type of New Growth stated in Returns received, 1890. Carcinoma 98 (including Scirrhus 8, Epithelioma 39, Rodent Ulcer 1); Sarcoma 9; Cancer or Malignant Disease only stated 69.

CANCER RECORDS FROM THE PRINCIPAL HOSPITALS OF VICTORIA—*continued.*

By A. W. FINCH NOYES, F.R.C.S.E., Surgeon to Out-Patients, Melbourne Hospital; Surgeon to the Skin Department, Alfred Hospital, Melbourne.

HOSPITAL. YEAR 1891.	No. of Cases.	Age Limits.	Sex. F.	Sex. M.	Abdomen.	Bladder.	Brain.	Breast.	Face.	Intestine.	Kidney.	Larynx.	Lip.	Liver.	Lower Extremity, including Buttock and Groin.	Lungs and Pleura.	Lymphatic Glands (when no other organ involved is given)	Maxillary Bones.	Mouth.	Oesophagus.	Orbit, including Eye.	Ovary.	Palate.	Pancreas.	Pelvis.	Penis.	Peritoneum—Mesentery and Omentum.	Pharynx.	Prostate.	Rectum.	Salivary Glands.	Scalp and Skull.	Scrotum.	Spinal Cord.	Spleen.	Stomach.	Testicle.	Thorax and Mediastinum, including Heart.	Thyroid Gland.	Tongue.	Tonsil.	Trunk.	Upper Extremity, including Shoulder.	Uterus.	Vagina.	Vertebra.	Vulva.	No Organ Specified.
Alfred, Melbourne	44	3-71	13	31	3	1	..	5	6	3	1	..	..	2	1	..	..	..	1	..	..	..	1	1	..	..	..	..	..	3	..	..	..	..	..	2	1	..	..	4	..	..	1	5	..	..	..	3
Ararat	3	47-67	2	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..
Ballarat	21	39-60	5	16	..	1	..	3	1	..	..	..	7	1	..	..	1	1	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	1	1	..	..	..
Bendigo	30	38-81	8	22	..	..	..	3	..	..	..	..	4	1	4	..	1	2	..	..	1	..	..	..	1	..	..	..	..	1	..	..	..	..	..	9	..	..	..	1	..	..	..	1	1	..	..	..
Castlemaine	12	27-84	3	9	..	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	2	..	..	..	1	..	..	..	2	..	..	..	3
Children's, Melbourne	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Clunes	1	48	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Echuca	2	62-66	0	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
Heathcote	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kilmore	1	40	1	0	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kyneton	2	64-67	0	2	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Maldon	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mansfield	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Melbourne	92	26-76	33	59	4	..	1	9	7	..	..	1	8	10	4	..	10	3	2	5	..	..	..	1	..	2	..	..	..	1	..	1	..	..	..	11	..	..	..	3	..	..	2	4	..	..	3	..
Stawell	5	47-76	1	4	1	..	..	1	..	..	..	..	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Swan Hill	1	52	1	0	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Warrnambool	2	55-68	0	2	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Wood's Point	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	216	..	67	149	8	2	1	23	15	4	1	1	21	16	9	..	13	7	3	5	1	..	1	3	2	4	1	..	..	7	..	1	..	..	..	26	1	1	..	9	..	..	3	14	2	..	3	8

Type of New Growth stated in Returns received. Carcinoma 135 (including Scirrhus 9, Epithelioma 52, Rodent Ulcer 7); Sarcoma 22; Cancer or Malignant Disease only stated 61.

YEAR 1892.	No. of Cases.	Age Limits.	Sex. F.	Sex. M.	Abdomen.	Bladder.	Brain.	Breast.	Face.	Intestine.	Kidney.	Larynx.	Lip.	Liver.	Lower Extremity, including Buttock and Groin.	Lungs and Pleura.	Lymphatic Glands (when no other organ involved is given)	Maxillary Bones.	Mouth.	Oesophagus.	Orbit, including Eye.	Ovary.	Palate.	Pancreas.	Pelvis.	Penis.	Peritoneum—Mesentery and Omentum.	Pharynx.	Prostate.	Rectum.	Salivary Glands.	Scalp and Skull.	Scrotum.	Spinal Cord.	Spleen.	Stomach.	Testicle.	Thorax and Mediastinum, including Heart.	Thyroid Gland.	Tongue.	Tonsil.	Trunk.	Upper Extremity, including Shoulder.	Uterus.	Vagina.	Vertebra.	Vulva.	No Organ Specified.
Alfred, Melbourne	31	25-66	18	13	..	..	..	7	1	..	..	1	..	3	..	..	2	4	..	..	..	1	..	..	1	..	..	1	..	..	..	..	..	..	..	3	..	..	..	2	..	1	..	..	1	..	1	2
Ararat	3	47-52	1	2	..	..	..	1	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Ballarat	32	37-81	8	24	..	..	..	..	3	1	1	..	5	2	1	..	3	1	..	..	..	..	..	1	..	1	1	..	..	1	..	..	..	..	..	7	..	..	..	1	..	..	..	2	1	..	..	..
Bendigo	28	18-80	7	21	..	1	..	..	7	..	..	1	5	..	2	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	2	..	..	1	3	1	..	..	..	..	..	1	2	..	..	..	..
Castlemaine	9	45-73	2	7	..	1	..	..	3	..	..	..	..	1	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	..	..	..
Children's, Melbourne	1	6	1	0	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Clunes	4	50-85	4	0	..	..	..	2	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Echuca	2	65-70	0	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
Heathcote	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kilmore	2	55-71	0	2	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Kyneton	5	55-76	1	4	1	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1
Maldon	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mansfield	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Melbourne	95	11-85	34	61	1	..	..	13	3	..	..	4	8	6	4	1	2	..	2	4	..	..	..	3	..	1	..	1	..	2	1	2	..	..	..	10	..	..	1	8	..	2	2	13	..	..	1	..
Stawell	2	49-70	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..
Swan Hill	1	29	0	1	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Warrnambool	1	47	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..
Wood's Point	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	216	..	78	138	2	2	..	23	19	2	2	6	21	12	7	2	10	5	3	4	1	1	..	6	1	2	1	2	..	3	1	4	..	..	1	25	1	..	1	12	..	3	3	20	2	1	2	3

Type of New Growth stated in Returns received. Carcinoma 145 (including Scirrhus 4, Colloid 1, Epithelioma 49, Rodent Ulcer 3); Sarcoma 23; Cancer or Malignant Disease only stated 48.

Cancer Records from the Principal Hospitals of Victoria—*continued.*

By A. W. Finch Noyes, F.R.C.S.E., Surgeon to Out-Patients, Melbourne Hospital; Surgeon to the Skin Department, Alfred Hospital, Melbourne.

Hospital. Year 1893.	No. of Cases.	Age Limits.	Sex F.	Sex M.	Abdomen.	Bladder.	Brain.	Breast.	Face.	Intestine.	Kidney.	Larynx.	Lip.	Liver.	Lower Extremity, including Buttock and Groin.
Alfred, Melbourne	25	4–76	11	14	..	..	..	5	..	..	..	..	1	3	..
Ararat	4	42–66	1	3	..	..	..	1	..	..	..	..	1	1	..
Ballarat	28	45–75	9	19	..	..	..	1	..	1	..	..	2	2	..
Bendigo	23	18–79	7	16	..	..	..	..	1	..	..	..	1	1	..
Castlemaine	8	54–68	0	8	..	..	..	1	1	..	..	..	..	2	..
Children's, Melbourne	..	..	..		..	..	..	..	..	..	..	..	..	..	..
Clunes	3	40–66	2	1	..	..	..	1	..	..	..	..	..	..	..
Echuca	1	59	0	1	..	..	..	..	..	..	..	..	..	..	..
Heathcote	5	53–67	1	4	..	..	..	..	..	..	..	..	..	..	..
Kilmore	1	66	0	1	..	..	..	..	..	..	..	..	1	..	..
Kyneton	9	33–73	2	7	..	..	..	..	..	..	..	..	1	..	..
Maldon	..	..	..		..	..	..	..	..	..	..	..	..	..	..
Mansfield	1	24	0	1	..	..	..	..	..	..	..	..	..	..	..
Melbourne	120	15–72	42	78	1	1	..	14	5	2	..	3	7	11	4
Stawell	2	54–76	0	2	..	..	..	..	..	..	..	..	1	..	..
Swan Hill	1	53	0	1	..	..	..	..	..	..	..	1	..	..	..
Warrnambool	2	55–59	1	1	..	..	..	..	..	..	..	..	1	1	..
Wood's Point	..	..	..		..	..	..	..	..	..	..	..	..	..	..
Total	233	..	76	157	1	1	..	23	7	3	..	4	16	21	4

Hospital. Year 1893.	Lungs and Pleura.	Lymphatic Glands (when no other organ involved is given).	Maxillary Bones.	Mouth.	Oesophagus.	Orbit, including Eye.	Ovary.	Palate.	Pancreas.	Pelvis.	Penis.	Peritoneum—Mesentery and Omentum.	Pharynx.	Prostate.
Alfred, Melbourne	..	4	·1	1	..	..	..	..	..	..	..	1	..	..
Ararat	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Ballarat	1	1	..	..	..	..	..	..	2	..	1	1	..	..
Bendigo	..	4	1	..	1	..	..	..	1	..	1	..	..	..
Castlemaine	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Children's, Melbourne	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Clunes	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Echuca	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Heathcote	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kilmore	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kyneton	..	..	..	..	..	1	..	..	..	..	..	..	..	..
Maldon	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mansfield	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Melbourne	2	11	2	9	3	..	..	..	1	3	1	1	1	..
Stawell	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Swan Hill	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Warrnambool	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wood's Point	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	3	21	4	10	4	1	..	..	4	3	3	3	1	..

Hospital. Year 1893.	Rectum.	Salivary Glands.	Scalp and Skull.	Scrotum.	Spinal Cord.	Spleen.	Stomach.	Testicle.	Thorax and Mediastinum, including Heart.	Thyroid Gland.	Tongue.	Tonsil.	Trunk.	Upper Extremity, including Shoulder.	Uterus.	Vagina.	Vertebra.	Vulva.	No Organ Specified.
Alfred, Melbourne	2	..	..	..	..	..	3	..	..	..	1	..	..	1	2	..	..	..	..
Ararat	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Ballarat	4	..	..	..	..	..	5	..	..	..	1	2	..	..	3	..	..	1	..
Bendigo	1	..	..	..	..	..	2	1	..	..	1	..	..	..	4	..	..	1	2
Castlemaine	..	..	..	..	..	..	1	..	..	..	2	..	..	..	..	..	..	..	1
Children's, Melbourne	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Clunes	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..
Echuca	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Heathcote	1	..	..	..	..	..	2	..	..	..	..	..	..	1	1	..	..	..	..
Kilmore	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kyneton	..	..	..	..	..	..	1	..	..	..	3	..	..	..	1	..	..	..	2
Maldon	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mansfield	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Melbourne	2	1	1	..	..	..	15	2	..	..	7	..	..	1	8	..	..	..	1
Stawell	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Swan Hill	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Warrnambool	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wood's Point	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	11	2	1	..	..	..	29	3	..	..	15	2	..	3	19	..	..	3	8

Type of New Growth stated in Returns received. Carcinoma 163 (including Scirrhus 16, Epithelioma 61, Rodent Ulcer 3); Sarcoma 31; Cancer or Malignant Disease only stated 39.

Year 1894.	No. of Cases.	Age Limits.	Sex F.	Sex M.	Abdomen.	Bladder.	Brain.	Breast.	Face.	Intestine.	Kidney.	Larynx.	Lip.	Liver.	Lower Extremity, including Buttock and Groin.
Alfred, Melbourne	49	17–76	23	26	..	..	..	7	3	1	..	1	4	4	2
Ararat	4	36–56	3	1	..	..	..	2	..	..	..	..	..	..	..
Ballarat	22	40–74	3	19	..	..	..	1	1	..	..	..	2	3	1
Bendigo	26	33–82	7	19	..	..	..	1	4	..	..	..	3	1	..
Castlemaine	8	30–67	4	4	..	..	..	..	..	..	..	..	..	1	..
Children's, Melbourne	3	4–8	2	1	..	..	..	..	..	..	1	..	..	..	..
Clunes	..	..	..		..	..	..	..	..	..	..	..	..	..	..
Echuca	4	45–77	3	1	..	..	..	..	1	1	..	..	..	..	..
Heathcote	3	73–81	1	2	..	1	..	..	..	..	..	..	1	..	..
Kilmore	..	..	..		..	..	..	..	..	..	..	..	..	..	..
Kyneton	8	38–76	1	7	..	..	..	1	..	..	..	..	4	..	..
Maldon	..	..	..		..	..	..	..	..	..	..	..	..	..	..
Mansfield	..	..	..		..	..	..	..	..	..	..	..	..	..	..
Melbourne	90	28–75	25	65	..	..	2	6	2	2	3	..	4	10	2
Stawell	9	47–88	3	6	..	..	..	1	2	..	..	2	1	..	..
Swan Hill	..	..	..		..	..	..	..	..	..	..	..	..	..	..
Warrnambool	..	..	..		..	..	..	..	..	..	..	..	..	..	..
Wood's Point	..	..	..		..	..	..	..	..	..	..	..	..	..	..
Total	226	..	75	151	..	1	2	19	13	4	4	3	19	19	5

Year 1894.	Lungs and Pleura.	Lymphatic Glands (when no other organ involved is given).	Maxillary Bones.	Mouth.	Oesophagus.	Orbit, including Eye.	Ovary.	Palate.	Pancreas.	Pelvis.	Penis.	Peritoneum—Mesentery and Omentum.	Pharynx.	Prostate.
Alfred, Melbourne	..	3	3	2	..	..	..	1	..	2	..	3	1	..
Ararat	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Ballarat	..	3	..	1	..	1	..	..	..	..	..	..	..	..
Bendigo	1	1	1	..	..	1	..	..	..	..	..	..	..	..
Castlemaine	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Children's, Melbourne	..	..	..	..	..	1	..	..	..	..	..	..	..	..
Clunes	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Echuca	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Heathcote	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Kilmore	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kyneton	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Maldon	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mansfield	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Melbourne	1	6	2	9	2	..	..	..	1	1	2	1	..	..
Stawell	..	..	..	..	..	..	..	..	..	1	..	..	..	..
Swan Hill	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Warrnambool	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wood's Point	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	2	14	6	12	2	3	..	1	1	4	2	4	1	..

Year 1894.	Rectum.	Salivary Glands.	Scalp and Skull.	Scrotum.	Spinal Cord.	Spleen.	Stomach.	Testicle.	Thorax and Mediastinum, including Heart.	Thyroid Gland.	Tongue.	Tonsil.	Trunk.	Upper Extremity, including Shoulder.	Uterus.	Vagina.	Vertebra.	Vulva.	No Organ Specified.
Alfred, Melbourne	1	..	..	..	..	..	3	..	..	..	2	..	..	..	5	1	..	..	..
Ararat	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1
Ballarat	1	..	..	..	..	..	5	..	..	..	1	..	1	..	1	..	..	..	..
Bendigo	..	..	..	..	..	..	3	..	1	..	3	..	..	1	3	1	..	..	1
Castlemaine	1	..	..	..	..	..	..	1	..	..	1	..	..	..	4	..	..	..	..
Children's, Melbourne	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Clunes	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Echuca	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1
Heathcote	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kilmore	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kyneton	..	..	..	..	..	..	..	..	..	..	3	..	..	..	..	..	..	..	..
Maldon	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mansfield	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Melbourne	2	2	..	..	..	1	15	..	1	..	6	..	..	1	5	..	..	..	1
Stawell	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..
Swan Hill	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Warrnambool	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wood's Point	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	5	2	1	..	..	1	26	1	2	..	16	..	1	2	22	2	..	..	4

Type of New Growth stated in Returns received. Carcinoma 155 (including Scirrbus 7, Epithelioma 66, Rodent Ulcer 8); Sarcoma 36; Cancer or Malignant Disease only stated 35.

CANCER RECORDS FROM THE PRINCIPAL HOSPITALS OF VICTORIA—*continued.*

By A. W. FINCH NOYES, F.R.C.S.E., Surgeon to Out-Patients, Melbourne Hospital; Surgeon to the Skin Department, Alfred Hospital, Melbourne.

HOSPITAL. YEAR 1895.	No. of Cases.	Age Limits.	Sex. F.	Sex. M.	Abdomen.	Bladder.	Brain.	Breast.	Face.	Intestine.	Kidney.	Larynx.	Lip.	Liver.	Lower Extremity, including Buttock and Groin.	Lungs and Pleura.	Lymphatic Glands (when no other organ involved is given)	Maxillary Bones.	Mouth.	Oesophagus.	Orbit, including Eye.	Ovary.	Palate.	Pancreas.	Pelvis.	Penis.	Peritoneum—Mesentery and Omentum.	Pharynx.	Prostate.	Rectum.	Salivary Glands.	Scalp and Skull.	Scrotum.	Spinal Cord.	Spleen.	Stomach.	Testicle.	Thorax and Mediastinum, including Heart.	Thyroid Gland.	Tongue.	Tonsil.	Trunk.	Upper Extremity, including Shoulder.	Uterus.	Vagina.	Vertebra.	Vulva.	No Organ Specified.
Alfred, Melbourne	34	26–77	15	19	1	..	..	4	1	1	..	1	4	5	1	1	..	2	..	..	..	..	..	1	..	..	1	..	..	2	..	..	..	..	..	1	..	..	..	4	..	1	..	2	..	..	1	..
Ararat	3	47–86	0	3	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..
Ballarat	15	36–87	3	12	..	..	..	..	3	..	1	..	..	3	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	1	..	..	1	2	..	..	..	..
Bendigo	31	7–75	6	25	..	..	..	3	4	..	..	..	10	1	..	..	..	3	..	..	..	..	..	..	1	1	1	..	..	..	..	..	..	..	..	4	..	..	..	2	..	..	..	1	..	..	..	..
Castlemaine	9	37–78	1	8	..	..	..	..	..	..	..	..	2	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	3
Children's, Melbourne	3	3–12	1	2	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
Clunes	2	63–66	0	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Echuca	1	70	0	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Heathcote	1	73	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kilmore	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kyneton	8	40–71	3	5	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..	2	..	..	..	..	2	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	..	..	..
Maldon	1	72	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Mansfield	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Melbourne	116	22–86	39	77	2	..	..	12	9	..	4	..	5	9	3	..	5	5	3	1	..	1	..	4	2	1	..	1	1	6	..	..	..	..	..	17	..	..	..	9	2	2	..	6	..	1	5	..
Stawell	4	51–65	1	3	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	2	..	..	..	..	..	..	..	..	..	..	..
Swan Hill	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Warrnambool	4	53–75	0	4	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1
Wood's Point	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	232	..	70	162	4	..	..	19	18	1	5	1	23	20	8	1	6	10	5	1	1	1	..	7	5	2	2	1	1	11	..	..	..	..	..	29	3	..	..	17	2	3	2	12	..	1	6	4

Type of New Growth stated in Returns received. Carcinoma 162 (including Scirrhus 9, Epithelioma 46, Rodent Ulcer 8); Sarcoma 31; Cancer or Malignant Disease only stated 39.

YEAR 1896.	No. of Cases.	Age Limits.	Sex. F.	Sex. M.	Abdomen.	Bladder.	Brain.	Breast.	Face.	Intestine.	Kidney.	Larynx.	Lip.	Liver.	Lower Extremity, including Buttock and Groin.	Lungs and Pleura.	Lymphatic Glands (when no other organ involved is given)	Maxillary Bones.	Mouth.	Oesophagus.	Orbit, including Eye.	Ovary.	Palate.	Pancreas.	Pelvis.	Penis.	Peritoneum—Mesentery and Omentum.	Pharynx.	Prostate.	Rectum.	Salivary Glands.	Scalp and Skull.	Scrotum.	Spinal Cord.	Spleen.	Stomach.	Testicle.	Thorax and Mediastinum, including Heart.	Thyroid Gland.	Tongue.	Tonsil.	Trunk.	Upper Extremity, including Shoulder.	Uterus.	Vagina.	Vertebra.	Vulva.	No Organ Specified.
Alfred, Melbourne	53	36–81	18	35	..	..	..	7	7	1	..	1	3	2	..	..	1	1	..	3	1	..	..	..	..	..	3	..	1	2	..	..	..	..	..	8	..	1	..	2	..	..	..	9	..	..	..	..
Ararat	5	36–74	1	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	..	..	..
Ballarat	8	36–85	1	7	..	..	..	..	1	..	..	..	..	1	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	..	..	..	..	..	..	..	..	..	..	..	..
Bendigo	25	17–77	6	19	..	..	..	1	2	..	..	..	4	3	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	7	..	..	..	4	..	..	1	2	..	..	..	..
Castlemaine	7	40–82	5	2	..	2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	..	..	1
Children's, Melbourne	1	13	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Clunes	3	37–60	0	3	..	..	..	..	..	1	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Echuca	1	43	0	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Heathcote	3	58–78	0	3	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Kilmore	1	35	0	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kyneton	13	38–77	4	9	..	..	..	..	..	..	..	1	2	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	..	..	..	..	..	..	2	..	..	..	2
Maldon	1	67	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Mansfield	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Melbourne	129	25–80	50	79	..	..	1	12	4	3	1	2	3	8	2	..	8	2	5	5	..	1	2	4	2	..	..	1	1	6	3	..	..	..	..	18	3	1	..	12	1	..	2	13	1	..	1	1
Stawell	6	65–74	1	5	..	..	..	..	1	..	..	2	1	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Swan Hill	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Warrnambool	4	51–72	0	4	..	..	..	..	1	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..
Wood's Point	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	260	..	87	173	..	2	1	22	16	6	1	6	15	18	2	1	13	4	6	10	1	1	2	4	2	1	3	1	2	10	3	1	..	..	..	44	3	3	..	18	1	..	3	28	1	..	1	4

Type of New Growth stated in Returns received. Carcinoma 132 (including Scirrhus 3, Epithelioma 35, Rodent Ulcer 6); Sarcoma 31; Cancer or Malignant Disease only stated 53.

Cancer Records from the Principal Hospitals of Victoria—*continued.*

By A. W. Finch Noyes, F.R.C.S.E., Surgeon to Out-Patients, Melbourne Hospital; Surgeon to the Skin Department, Alfred Hospital, Melbourne.

Hospital.	No. of Cases.	Age Limits.	Sex. F.	Sex. M.	Abdomen.	Bladder.	Brain.	Breast.	Face.	Intestine.	Kidney.	Larynx.	Lip.	Liver.	Lower Extremity, including Buttock and Groin.	Lungs and Pleura.	Lymphatic Glands (when no other organ involved is given).	Maxillary Bones.	Mouth.	Oesophagus.	Orbit, including Eye.	Ovary.	Palate.	Pancreas.	Pelvis.	Penis.	Peritoneum—Mesentery and Omentum.	Pharynx.	Prostate.	Rectum.	Salivary Glands.	Scalp and Skull.	Scrotum.	Spinal Cord.	Spleen.	Stomach.	Testicle.	Thorax and Mediastinum, including Heart.	Thyroid Gland.	Tongue.	Tonsil.	Trunk.	Upper Extremity, including Shoulder.	Uterus.	Vagina.	Vertebra.	Vulva.	No Organ Specified.
Year 1897.																																																
Alfred, Melbourne	58	34-85	29	29	1	1	..	5	2	2	..	2	4	6	..	3	1	4	..	1	..	..	..	..	..	1	1	..	..	6	..	..	..	..	1	4	..	..	..	3	..	..	1	9	..	..	..	..
Ararat	6	61-81	1	5	..	..	..	1	1	..	..	..	1	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Ballarat	26	23-89	4	22	..	..	..	..	1	..	..	..	4	2	..	..	1	..	..	..	..	..	..	..	..	2	..	..	..	4	..	..	..	..	..	6	1	..	..	2	..	..	2	..	1	..	..	..
Bendigo	31	26-77	5	26	..	..	..	2	3	..	..	1	7	1	..	..	5	..	..	..	..	..	1	..	1	..	..	1	..	2	..	1	..	..	..	3	..	..	..	..	..	1	1	1	..	..	..	..
Castlemaine	8	40-78	2	6	..	..	..	..	2	..	..	..	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	2
Children's, Melbourne	1	5	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Clunes	3	60-85	1	2	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Echuca	3	50-61	0	3	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Heathcote	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kilmore	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kyneton	13	34-70	2	11	1	..	..	..	..	..	..	1	4	..	1	..	1	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	..	..	1
Maldon	1	42	1	0	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mansfield	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Melbourne	95	14-92	36	59	2	..	..	14	5	4	..	..	3	9	4	1	6	3	6	1	..	1	..	2	1	..	..	1	..	1	..	1	..	..	..	7	..	..	..	5	..	..	..	9	1	2	..	6
Stawell	5	37-69	2	3	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..
Swan Hill	1	74	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Warrnambool	2	53-69	1	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wood's Point	1	51	0	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	254	..	85	169	4	1	..	24	14	7	..	4	24	24	6	4	16	9	7	2	1	1	2	3	2	4	2	2	..	14	..	2	..	..	1	22	1	..	..	10	..	2	4	21	2	2	..	10

Type of New Growth stated in Returns received. Carcinoma 178 (including Scirrhus 8, Epithelioma 72, Rodent Ulcer 3); Sarcoma 20; Cancer or Malignant Disease only stated 56.

Hospital.	No. of Cases.	Age Limits.	Sex. F.	Sex. M.	Abdomen.	Bladder.	Brain.	Breast.	Face.	Intestine.	Kidney.	Larynx.	Lip.	Liver.	Lower Extremity, including Buttock and Groin.	Lungs and Pleura.	Lymphatic Glands (when no other organ involved is given).	Maxillary Bones.	Mouth.	Oesophagus.	Orbit, including Eye.	Ovary.	Palate.	Pancreas.	Pelvis.	Penis.	Peritoneum—Mesentery and Omentum.	Pharynx.	Prostate.	Rectum.	Salivary Glands.	Scalp and Skull.	Scrotum.	Spinal Cord.	Spleen.	Stomach.	Testicle.	Thorax and Mediastinum, including Heart.	Thyroid Gland.	Tongue.	Tonsil.	Trunk.	Upper Extremity, including Shoulder.	Uterus.	Vagina.	Vertebra.	Vulva.	No Organ Specified.
Year 1898.																																																
Alfred, Melbourne	54	21-78	19	35	..	..	..	5	7	2	..	..	2	3	1	..	5	2	..	2	..	..	..	4	..	1	2	..	..	1	1	..	..	..	..	5	..	..	..	2	..	..	4	3	..	..	..	2
Ararat	6	21-70	1	5	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	2
Ballarat	19	39-82	10	9	..	..	..	3	..	..	..	..	5	1	..	1	2	..	..	..	..	..	..	1	..	..	..	..	..	2	..	..	..	..	..	1	..	..	..	..	..	..	..	3	..	..	..	..
Bendigo	19	26-75	4	15	..	..	..	1	1	..	..	..	4	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	2	..	..	..	1	..	..	1	1	..	..	..	3
Castlemaine	9	44-74	4	5	..	..	..	1	2	..	..	..	1	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	2
Children's, Melbourne	2	2-6	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Clunes	1	64	0	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Echuca	3	50-83	1	2	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
Heathcote	2	57-78	1	1	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kilmore	1	50	0	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kyneton	5	42-73	2	3	1	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
Maldon	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mansfield	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Melbourne	152	15-83	50	102	7	..	1	15	8	3	1	2	9	9	4	..	6	6	6	4	..	4	..	..	1	1	2	1	1	6	..	..	..	..	..	28	..	..	1	11	2	..	2	8	..	..	1	2
Stawell	5	42-53	2	3	..	..	..	..	1	..	..	..	1	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Swan Hill	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Warrnambool	2	40-53	0	2	..	..	..	..	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wood's Point	1	47	0	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	281	..	95	186	8	..	1	26	21	6	1	2	27	16	7	1	17	10	6	6	..	4	..	6	2	2	4	1	1	11	1	..	..	..	1	38	..	..	1	16	2	..	7	15	..	..	1	13

Type of New Growth stated in Returns received. Carcinoma 197 (including Scirrhus 4, Epithelioma 66, Rodent Ulcer 9); Sarcoma 44; Cancer or Malignant Disease only stated 40.

Cancer Records from the Principal Hospitals of Victoria—*continued.*

By A. W. Finch Noyes, F.R.C.S.E., Surgeon to Out-Patients, Melbourne Hospital; Surgeon to the Skin Department, Alfred Hospital, Melbourne.

Hospital. Year 1899.	No. of Cases.	Age Limits.	Sex. F.	Sex. M.	Abdomen.	Bladder.	Brain.	Breast.	Face.	Intestine.	Kidney.	Larynx.	Lip.	Liver.	Lower Extremity, including Buttock and Groin.	Lungs and Pleura.	Lymphatic Glands (when no other organ involved is given).	Maxillary Bones.	Mouth.	Oesophagus.	Orbit, including Eye.	Ovary.	Palate.	Pancreas.	Pelvis.	Penis.	Peritoneum—Mesentery and Omentum.	Pharynx.	Prostate.	Rectum.	Salivary Glands.	Scalp and Skull.	Scrotum.	Spinal Cord.	Spleen.	Stomach.	Testicle.	Thorax and Mediastinum, including Heart.	Thyroid Gland.	Tongue.	Tonsil.	Trunk.	Upper Extremity, including Shoulder.	Uterus.	Vagina.	Vertebra.	Vulva.	No Organ Specified.
Alfred, Melbourne	73	5–80	24	49	..	..	..	7	9	4	..	..	7	3	2	4	9	2	1	..	1	..	..	1	..	..	2	1	..	4	..	..	1	..	..	4	..	..	1	3	1	..	..	6	..	..	..	..
Ararat	5	37–70	2	3	..	..	..	1	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..
Ballarat	25	14–77	6	19	..	..	..	1	1	..	..	..	7	2	..	..	4	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	5	..	..	..	1	..	..	..	2	..	..	..	..
Bendigo	27	2–80	5	22	1	..	..	1	3	..	1	1	2	..	1	..	2	..	..	..	1	..	..	2	..	..	..	..	..	..	..	..	..	..	..	5	..	..	..	3	..	..	1	2	..	..	..	1
Castlemaine	5	58–79	1	4	..	..	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	2
Children's, Melbourne	2	2–13	2	0	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Clunes	2	62–77	1	1	..	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Echuca	2	40–42	1	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..
Heathcote	3	42–56	0	3	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Kilmore	1	38	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..
Kyneton	11	27–73	1	10	..	..	..	..	1	..	..	..	2	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	..	1	..	..	..	1	..	..	..	2
Maldon	1	62	0	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mansfield	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Melbourne	125	15–79	44	81	2	2	1	13	6	4	..	..	6	10	3	..	6	2	2	5	..	..	2	..	2	..	1	1	2	2	..	..	..	..	..	15	4	2	1	11	1	..	3	6	..	2	..	8
Stawell	2	40–68	1	1	..	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Swan Hill	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Warrnambool	3	33–68	0	3	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
Wood's Point	1	48	0	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	288	..	89	199	4	2	1	25	20	8	1	1	32	15	6	5	23	6	4	5	2	..	2	4	2	2	3	2	2	7	..	..	1	..	..	33	4	2	2	21	2	..	4	19	..	2	..	14

Type of New Growth stated in Returns received. Carcinoma 181 (including Scirrhus 7, Epithelioma 63, Rodent Ulcer 1); Sarcoma 41; Cancer or Malignant Disease only stated 66.

Hospital. Year 1900.	No. of Cases.	Age Limits.	Sex. F.	Sex. M.	Abdomen.	Bladder.	Brain.	Breast.	Face.	Intestine.	Kidney.	Larynx.	Lip.	Liver.	Lower Extremity, including Buttock and Groin.	Lungs and Pleura.	Lymphatic Glands (when no other organ involved is given).	Maxillary Bones.	Mouth.	Oesophagus.	Orbit, including Eye.	Ovary.	Palate.	Pancreas.	Pelvis.	Penis.	Peritoneum—Mesentery and Omentum.	Pharynx.	Prostate.	Rectum.	Salivary Glands.	Scalp and Skull.	Scrotum.	Spinal Cord.	Spleen.	Stomach.	Testicle.	Thorax and Mediastinum, including Heart.	Thyroid Gland.	Tongue.	Tonsil.	Trunk.	Upper Extremity, including Shoulder.	Uterus.	Vagina.	Vertebra.	Vulva.	No Organ Specified.
Alfred, Melbourne	59	23–81	24	35	..	..	..	6	3	..	..	..	3	1	..	..	6	1	4	1	..	..	..	1	..	1	..	..	..	5	..	..	..	..	..	12	..	1	..	4	1	..	..	7	..	..	..	2
Ararat	1	66	0	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Ballarat	18	9–77	3	15	..	..	..	..	1	..	..	..	5	2	1	..	..	1	..	1	..	..	..	..	..	..	..	..	..	1	..	1	..	1	..	2	..	1	..	..	..	..	..	1	..	..	..	..
Bendigo	24	21–82	9	15	..	2	..	1	6	..	..	..	1	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	3	..	..	..	1	..	..	..	3	..	1	..	2
Castlemaine	3	58–80	2	1	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..
Children's, Melbourne	2	6–12	0	2	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
Clunes	1	66	1	0	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Echuca	2	18–60	0	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Heathcote	3	44–62	3	0	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..
Kilmore	2	53·61	0	2	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Kyneton	6	37–64	2	4	..	..	..	1	..	..	..	..	1	1	..	..	..	2	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Maldon	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mansfield	1	39	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Melbourne	139	12–85	39	100	2	5	1	11	3	8	1	3	7	9	3	..	5	4	5	3	..	..	..	4	1	4	3	2	..	9	..	..	..	..	..	22	1	2	1	6	3	..	2	8	..	..	..	1
Stawell	8	41–77	0	8	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	..	..	..	..	..	..	..	..	..	..	..
Swan Hill	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Warrnambool	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wood's Point	1	69	0	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	270	..	84	186	2	7	1	20	16	8	1	4	19	15	4	..	13	10	9	7	..	..	..	5	1	7	3	2	..	18	..	1	..	1	..	43	1	4	1	11	5	..	2	22	..	1	..	6

Type of New Growth stated in Returns received. Carcinoma 220 (including Scirrhus 13, Epithelioma 67, Rodent Ulcer 7); Sarcoma 26; Cancer or Malignant Disease only stated 24.

ETIOLOGY OF CANCER.

BY

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An honest sense of appreciation compels me to express my admiration for the elaborate, laborious, and comprehensive address with which Professor Allen has opened this discussion. It would require a statistician's digestion to make full use of the various tables which have been prepared for us with infinite labour and care. The subject under discussion has a melancholy interest for all of us, physician and layman alike. Whatever triumphs have been achieved by medicine and hygiene in diminishing the ravages of many infectious diseases, notably, of smallpox, cholera, tuberculosis, and plague, medical science is still baffled by this common, cruel, and deadly disease—cancer. Surgeons may boast of success in some limited regions, gynæcologists may hope to cure by extreme measures 10 per cent. of the cases of uterine cancer, but hygienists are silent on the question of cause and prevention, and physicians stand in the presence of this disease with folded hands. Loeffler's recent suggestion, that malaria may be antagonistic to cancer, offers a very faint hope. An attack of Tertian ague is said to have cured cancer. Ague may indeed be the cause of the lesser frequency of cancer in the tropics. In the infectious diseases, the great successes have been won by a close study of their causes, and, in my humble judgment, the best prospects of success, both with regard to treatment and prevention, lie along the road that leads to a better understanding of the nature and origin of cancer.

The frequency of cancer may well appal us, unless there is some satisfaction in knowing that it is a disease of mature age, and pre-eminently of old age. Whether the increase, demonstrated by statistics, be real or apparent, no one has the hardihood to assert that cancer is diminishing. Its prevalence can be measured by the annual cancer mortality in various countries and towns per 1,000,000 persons:—Switzerland (1898), 1324 per 1,000,000; Frankfort, 980; Hamburg, 978; Brighton, 830; England and Wales, 802; Victoria, 986; Prussia, 620; New Zealand, 584; New South Wales, 565; Tasmania, 521 (in Tasmania there has been little change since 1880); South Australia, 517; Queensland, 430; West Australia, 317. Of course, in new countries, such as West Australia and Queensland, the difference is largely due to the comparative youth of a large section of the population. But, if we adjust the cancer mortality in age-periods, as statisticians now-a-days require, the incidence of the disease is far more startling. One English authority tells us that 1 out of every 16 males, and 1 out of every 9 females, reaching the age of 35, dies of cancer. Females up to the age of 60 suffer more than males of the same age, on account of the greater frequency of cancer of the female reproductive organs; but beyond the age of 60, males suffer more than females. Professor Allen's statistics on this point are instructive. In Switzerland, New South Wales, and Victoria, on the whole, men suffer more than women:—Switzerland, 2141 males, 1990 females; New South Wales, 409 males, 356 females. This is contrary to the general rule. In New South Wales, 631 out of 765 victims of cancer are married, and the average number of children is about 6. Accordingly, whatever cancer may do, it does not threaten the extinction of the race; indeed, those who die of cancer have already done more than their fair share in filling the waste places of the earth.

Dr. Tatham's comparative mortality figures show that occupation has its influence. Clergymen and doctors suffer least, while sweeps suffer most.

Brewers, hotel-keepers, commercial travellers, and lawyers suffer twice as much as clergymen. Coal-miners enjoy a relative immunity from cancer as from phthisis.

Thus far there is general agreement. Doctors agree with each other, and with the statisticians. The real bone of contention is whether or not cancer is increasing year by year. Certain it is that almost all statistics show an increase. Certified deaths from cancer have doubled, trebled, quadrupled, in a quarter of a century. Is this increase, which statistics undoubtedly show, real or apparent? Dr. Newsholme and some others state that the increase is entirely apparent, increasing accuracy of diagnosis and more careful certification of the causes of death accounting for the yearly increases. Beyond all doubt these causes account for some of the increase, and cause the cancer mortality curve of males to approach that of females, particularly by the better diagnosis of internal cancer. Improvement in diagnosis in the last 30 years may account for much, and specialism has certainly helped to swell the increase; but has the improvement during this period, and notably during the last ten years, kept pace with the giant strides of cancer? This is the crucial question, and we are not in a position to answer it. I should be as one beating the air if I attempted to recount the differences of opinion on this question. Professor Allen has given fresh material for thought, but his mass of statistics does not help us. Does he wish to argue that cancer is diminishing? Doctors differ; statisticians differ. Mr. Teece, the actuary and expert chief of the largest and best insurance society in the British dominions, argues in favour of a real increase. Mr. Coghlan agrees with him. We must trust those who are trained to deal with and analyse figures. It is no use our saying that the actuaries and statisticians are wrong. They are right in their own work. The fault is ours, if we have unwittingly misled them. They merely arrange according to recognised rules the facts we supply to them. A pathologist understands the pitfalls of clinical diagnosis, upon which our cancer statistics rest. Professor Allen has not touched the important fact that, as a result of wrong diagnosis in a scattered population, the number of deaths from cancer unrecorded or recorded under a totally wrong name, may be considerable; so that his and other low figures may, after all, have quite another explanation. Without accurate pathological diagnosis, we can but remain in the dark. *There is, in my opinion, more cancer in Australia than statistics show.* Our function as medical men is, as far as possible, when cancer is suspected, to solemnly recognise the paramount importance of accurate diagnosis and careful certification of the causes of death. We lay the very foundation and supply the bricks and mortar out of which the stately edifice of mortality statistics is built. It is in our power, and in our power alone, to settle these differences of opinion, and find harmony in truth. If we cannot settle this vexed question, no other body of men can; but we cannot possibly settle the dispute at this stage. We should settle it soon enough if our diagnosis, instead of being clinical, might be pathological. Would that we could impress upon the public mind the great importance of a pathological diagnosis. Such occasions as these are rare and great opportunities for explaining to the public the difficulties that lie athwart the road to truth. The Chinese object to *post-mortem* examinations, but in intelligent and progressive communities there is no room for a confusion of the corruptible and the incorruptible. People may chide us for error, and even ignorance, but too often the people's own morbid sentiment stands in the way of progress in knowledge. "*Etiam mortui prosunt*"—"*Imperial Cæsar dead*"—may do something better than stop a hole to keep the wind away. Emperors and Presidents do not stand in the way of a legitimate inquiry. If all cases of plague are examined after death, why should not all cases of suspected cancer be likewise examined—if not with the consent

of friends, at least with the authority of legal enactments? Even if in our hospitals a *post-mortem* could be demanded, we should get nearer the truth. Within the last year I have rescued four cases from the limbo of obscurity and erroneous diagnosis by a *post-mortem* examination. A case of gangrene of the lung, secondary to sarcoma of the stomach, with perforation; a case of gall-stones and septic cholangitis, complicated with cancer of the liver; a case of ascites, secondary to cancer of the peritoneum; and a case of mediastinal tumour; in a fifth case, a man died of cerebral hæmorrhage, while he was suffering from symptoms pointing to a fatal thoracic tumour. The *post-mortem* was refused. Was this case certified as cerebral hæmorrhage? Yet there was probably cancer also. This discussion surely emphasises the importance of correct diagnosis after death.

Our own New South Wales statistics furnish plenty of internal evidence of careless certification, especially in the important group of diseases of the stomach. If we compare the cancer statistics of New South Wales with the careful statistics of Hamburg, we find—

Hamburg Statistics.

Males.	Stomach 50°/₀.
	Intestinal Tract 75°/₀.
	ditto including Liver 85·8°/₀.
Females.	Stomach 29°/₀.
	Intestinal Tract 40°/₀.

New South Wales Statistics.

Males.	Stomach 27°/₀.
Females.	Stomach 13°/₀.

This difference led me to examine the causes of death by diseases of the stomach in the New South Wales statistics. I found in many cases of persons over 40 of 50 such diagnoses as hæmatemesis (in three males), diseases of the stomach (*sic*), ulceration of the intestines, diseases of the liver (*sic*), hepatitis, perotinitis ascites—in all, 200 cases in those over 35, the great majority being over 45 years of age. Surely we may say that many cases of cancer are herein concealed under a more euphonious name?

If we make our diagnoses, as far as possible, pathological instead of clinical, we shall at the same time settle these differences, and establish harmony of opinion by the discovery of truth.

I turn to the etiology of cancer with a heavy heart. Till recently anatomy and histology have furnished the only premises on which a discussion on the origin and nature of cancer could be based, and such discussions, measured by practical lessons, have been weary, stale, flat, and unprofitable. If, indeed, cancer were due to an inlying disposition—to a spontaneous change in the cell itself (a belief to which Professor Allen inclines)—'twere well to learn ourselves, and to teach others, to bear the inexorable decree of Fate with the calm heroism of the Stoic. But this has to be proved. Of course, at the present stage of knowledge, histology must occupy a prominent place, because the very diagnosis of cancer rests on structural character. Gross anatomical characters may serve statistical purposes, but, according to histological definition, cancer is a tumour composed of epithelial cells, capable of persisting and multiplying, of aberrant type, but like parentage, and lying in spaces of connective tissue infiltrated with small cells. On this structural basis we distinguish carcinoma from sarcoma. Except in Hamburg, statistics do not recognise this distinction. The Hamburg statistics show that there are about 20 cases of carcinoma to 1 of sarcoma. This hardly tallies with Professor Allen's figures. Yet this histological classification breaks down in the case of alveolar sarcomata and endotheliomata, which may approximate

now to the sarcomatous now to the carcinomatous type. The distinguished author of the Pathology of Tumours—Virchow—taught that the connective tissue stroma was the matrix of the tumour, and the epithelial cells were derived from the invaded tissues by a catalytic process. Waldeyer recognised the epithelial cell as the essential element. Now-a-days the trend of opinion is that the growth of cancer is altogether independent of the invaded tissue—the invaded tissue suppyling no cell elements—not even if the invaded tissue exactly resembles the original tissue from which the cancer sprang. Cancer cells alone breed cancer cells, both in the primary and secondary growths. This view is held by Ribbert to be a strong argument against the parasitic theory of the origin of cancer. Now, if we start with the assumption that cancer has a definite structure of this type, and has no relation, structural or etiological, with sarcoma or other form of tumour, it is a logical deduction that all investigations bearing on the hereditary or infectious nature of cancer must be hall-marked in the first place by the histologist, unless, indeed, we believe with Verneuil in the existence of a neoplastic diathesis. Hence we learn that progress in our knowledge of the nature and cause of cancer demands histological investigations.

The unique character of the cancer-cell is that it assumes a simpler form, and nevertheless acquires the self-possessed power of persisting. It does not degenerate. This is Hansemann's Anaplasia. When to this faculty is added the power of multiplication, carcinoma is the result. Histologists have no better explanation of the origin of cancer. They tell us merely that the cells revert to a simpler form, and the energy usually spent in differentiation and function manifests itself in continuous, unrestrained, and irresistible growth. Cancer is the result of a unique progressive biological process of growth that has no analogy in normal tissue.

Ribbert reverts to Virchow's view in part, and holds that cancer begins as a chronic inflammation of connective tissue that causes detachment of epithelial cells, which subsequently acquire the power of persisting and multiplying. It is a sign of the times that now-a-days neither Hansemann nor Ribbert calls himself an opponent of the parasitic view. Hansemann merely denies that the so-called cancer bodies are parasites. Ribbert holds that if there is a parasite, it acts primarily and exclusively in the connective tissue. He denies that there is any symbiosis of cancer body and cancer cell, and, *ipso facto*, does not recognise the cancer bodies as independent structures.

If, indeed, cancer and sarcoma are due to tissue qualities, one may well wonder why cancer occurs so seldom in animals. Cancer of the stomach, of the uterus, of the tongue hardly occurs in dogs, though dogs suffer from cancer, especially in parts exposed to uritation—in the skin and penis, and around the anus. Cancer of the mammary gland is very rare in sluts. Is it because they do not live into the cancerous age? Does the elephant develop cancer? The flesh-eating dog suffers from cancer, but the vegetarian sheep and ox do not escape. The dirty swine is even less obnoxious. If ever cancer be proved to be of parasitic origin, it will be by the study of tumours, natural and experimentally produced, in animals. Hitherto pathologists have not paid sufficient attention to animal diseases of this kind.

In their clinical aspects, malignant growths, both cancer and sarcoma, are characterised (1) by the unique phenomenon of independent cell life, by which a mass of cells, persisting and multiplying, can grow unrestrained by tissue, beyond the normal limits; (2) by metastasis; and (3) by cachexia.

What is the cancerous cachexia? Is it due to a toxic influence? At the outset of this inquiry we must exclude the effects of hæmorrhage, disease of bone, pressure on the larynx, or other organs interfering with the circulation or blood-forming organs, but especially of inflammation, suffocation, and putrefaction. Bierfreund (Ehrlich) states that benign tumours, though

large and growing rapidly, do not alter the character of the blood, while malignant tumours, independent of size or situation, or complications, reduce considerably the Hb. value of the blood. There is oligo-chromæmia to the extent of 15 to 30 per cent. Moreover, after operations the regeneration of blood is slower in the case of malignant tumours. Be the etiology of cancer what it may, the anæmia accompanying malignant growths seems to be due to a toxic substance. The great increase of tissue disintegration resulting in emaciation, with increased discharge of urea, and the coma of cancer, are held to be the effects of a toxin (Ehrlich). As yet urinary analyses throw no light on this question. But we may well ask, *How can proliferating tissue produce such a toxin?* Grawitz, in his experiment of injecting extracts of tumours into rabbits, observed only thinning of the blood; but rabbits are immune, and, according to Ehrlich's theory of the "Seiten-ketten," there would be no affinity between these and the toxins. The conclusion is that the anæmic state of the blood in uncomplicated cases of malignant tumours shows that tumours affect the blood. If, indeed, the cachexia is of a specific toxic nature, a strong argument in favour of the parasitic origin of cancer has surely been found. The parasitic theory of the origin of cancer is infinitely more attractive than the histogenetic, and best explains many strange anomalies. There is nothing new to be said on the subject of cancer houses, except that Mr. Teece records another instance. A mother, who had three sons, died of cancer of the uterus. The eldest son married, and lived in his mother's house. His wife died of uterine cancer. The second son also married, and brought his wife to live at the same house. His wife died of uterine cancer. The third son was only accepted in marriage on condition that they did not live in this house. History is silent about the third daughter-in-law. Behla has emphasised the view that the existence of cancer districts strengthens the parasitic theory. While the general mortality from cancer in most places varies from 2½ to 4 per cent. of all deaths, some districts show rates as high as 10 per cent. (Luckan), 13 per cent. (Grossbringen), even 15 per cent. (Cormeilles). But too much prominence must not be given to this geographical statistical method, where small areas are concerned. The mathematical theory of chance may explain even startling anomalies. Again, there are cases of apparent infection between wife and husband. The Emperor and Empress of Germany both died of cancer. Infection of adjacent but not contiguous parts occurs, as in the upper and lower lip, and elsewhere. Moreover, as Sir James Paget pointed out long ago, there are interesting analogies between cancerous growths and the infective granulomata, certain infectious tumours of the lower animals, and cancer-like growths in plants. Czerny, recognising that the usual sites of cancer are exposed to irritation, holds that, like inflammation, cancer is the result of some extrinsic cause. Dr. Jamieson has to deal with the subject of irritation. I may, however, say that several years ago I examined a case of so-called brand cancer in a cow, and found typical epithelioma, with hyaline degeneration in the cells. Dr. Payne is of opinion that food is a factor in the causation of cancer—over-eating, excessive meat diet, perhaps alcohol. Behla, on the contrary, traces cancer to the consumption of raw vegetables and raw fruit. Such substances are necessarily contaminated with various living organisms, and may be the vehicle of infection. Behla anticipated Gayford in describing amœbæ as the cause of tumour formations; but all these and such like views concerning the origin of intestinal cancer are purely speculative.

A syphilitic ulcer of the mouth may become cancerous. A rodent ulcer may be attacked with lupus. The relation between cancer and tuberculosis is an unwritten chapter. It is not quite a new idea that the tuberculisable contingent that escapes tuberculosis may become cancerous. There may be some truth in this. I had the idea before I knew that Mr. Coghlan had shown

that just as the mortality curve from tuberculosis fell in 1884, the mortality curve in cancer began to rise. The interesting cases of multiple or concurrent growths of carcinoma and sarcoma are by no means inconsistent with the parasitic view. Sanfelice thinks that sarcoma is merely cancer of connective tissue; and Plimmer adopts this view. The multiple nodules of molluscum contagiosum are of parasitic origin.

Undoubtedly certain tumours do arise from embryonic rests or developmental faults, such as true teratomata dermoid cysts and the hypernephromata that resemble adrenal tissue in structure; but the question that concerns us is whether cancer is of like origin or due to extrinsic agents. Coccidia cause true papilloma, but not epithelioma, in rabbits; even in man, coccidia cause the multiple epithelial tumours of molluscum (epithelioma) contagiosum. Warwicke has also described a case, in which the coccidium has been unmistakably photographed; but this tumour was a granuloma, containing giant cells, rather like an actinomycolic focus. But, although coccidiosis in rabbits is a papillomatous rather than an epitheliomatous growth, Pianese, who rejects the parasitic origin of cancer, has recently described a condition in the kidney of a guinea pig, in which all the changes so familiar to us in cancer cells are associated with the actual presence of a sporozoon that multiplies in a sporulation cycle with merozoits and micro-merozoits. He describes (1) active mitosis of the tubal epithelium-typical, and a typical *exactly like that of cancer cells*; (2) peculiar cell-degenerations (karyolysis, karyorhexis, nucleinrhexis, nuclein-lysis), *which also exactly resemble those of cancer cells;* and (3) *bodies enclosed within the epithelial cells, like the cancer bodies.* He asks—Are these all cell changes, or stages in the growth cycle of the coccidium? Thus Pianese, quoted by Professor Allen as a convinced opponent of the parasitic theory, admits now that a sporozoon may produce in the guinea pig cells and bodies structurally resembling in every minute detail the cancer cells and cancer bodies in man. Pianese in 1901 appears as a witness against Pianese in 1896. Pianese has not yet made up his mind about this new discovery, but he says—" Even if I should decide that the bodies are not parasites, the view would always be entirely justified that the enclosed bodies in cancer cells—since these productions occur only in kidneys with such coccidia, and therefore may be produced by the action of such parasites—can be produced by a like action of psorozoaria in cancer. Pianese could not write now, as Professor Allen quotes him—" All the forms that have as yet been described as parasites are easily explained as special cell-alterations." It is surely a singular fact that the very authority who, in 1896, by the use of special elaborate stains, came to the conclusion that the changes in cancer tissue in man were not due to a parasite, finds, in 1901, by the very same methods, that exactly the same changes in a guinea pig are due to a parasite. There is still much to be learned about the psorozoa. They are probably very fastidious or selective—one revels in the epithelium of the liver, another in the epithelium of the kidneys, another in the epithelium of the skin—but all infest epithelial cells. May not a coccidium be related to cancer? Cancer differs essentially from the reaction of tissue to vegetable organisms, such as bacteria. This difference may depend on the fact that the organisms associated with cancer belong to the animal kingdom; the reaction of tissue to the presence of protozoa may take the form of cancer, or even sarcoma.

What else may give that mysterious thrust to epithelial tissue that leads to a cancerous growth? Even those who hold that cancer is due to a parasite are by no means agreed among themselves concerning the nature or situation of the parasite. Is it a coccidium or other sporozoon, an amœbæ, a blastomycetes? The discrepancies of the high priests of this cult must be harmonised before we can become disciples. Ruffer finds the parasite in the nucleus, Foi in the cell protoplasm, Russell in the extra cellular tissues, others

in the lymphatics. One of the most attractive exponents of the parasitic view is Sanfelice, but he is convinced, not only that there is a cancer parasite, but that it is a blastomycetes. By numberless experiments on animals, Sanfelice has proved that blastomycetes can cause tumours in animals resembling in every feature the cancerous growths in man. He further aims at establishing harmony out of the chaos of conflicting observations and opinions. The same saccharomyces neoformans injected subcutaneously produces under suitable conditions a cancer; injected into veins, produces a tumour of mesoblastic structure resembling a sarcoma. Moreover, he holds that the saccharomyces neoformans, in course of time, loses the faculty of growing in artificial media, and is converted into bodies identical with Russell's fuchsin bodies or yeasts. The vision of truth seems still very far off. I was myself extremely sceptical about the parasitic origin of cancer, till I became acquainted with Busses', Curtis', and Sanfelice's observations and experiments. I have myself verified Sanfelice's work in the smaller animals. Tumours are undoubtedly produced by injecting Sanfelice's blastomycetes into guinea pigs, and, as Sanfelice admits, the tumours are formed of blastomycetes—not of cells like cancer cells, lying in a firm fibrous stroma. If Sanfelice's work in the larger animals may be accepted in the same way as his work in the smaller animals, which I have verified by experiment, Sanfelice has advanced our knowledge many steps; but much remains to be done. There are great gaps that must be filled up before we can assert that cancer is due to a parasite. Gayford may teach us much in the near future. If once the parasite is found, science may help us. If there is no parasite to be discovered, it is perhaps too much to hope that a serum will be found that will act on cancer cells in the same selective way as various sera are found to act on the blood-cells in the interesting experiments on hæmolysis.

Germany has organised for the investigation of cancer a society consisting of physicians, surgeons, hygienists, and veterinary surgeons. More recently, the City of Frankfort has devoted a large sum to the study of cancer, and has wisely charged the brilliant investigator and thinker, Professor Ehrlich, to attempt the solution of the etiology of cancer. May Ehrlich's quest be crowned with success in the cause of suffering humanity.

Even though as individuals we may not be able to make laboratory experiments, there is a wide field of observation open to all of us, especially with regard to such questions as cancer districts, cancer houses, so-called infection, and hereditary influence.

THE PART PLAYED BY INJURY, CHRONIC IRRITATION, AND INFLAMMATION IN THE PRODUCTION OF NEW GROWTH.

BY

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Of late years an enormous amount of valuable research-work has been carried out by numerous observers in connection with the aetiology of carcinoma. Of this work, by far the greater portion has been devoted to attempts to prove that these growths owe their origin to the action of certain lowly forms of organisms belonging either to the class of protozoa or blastomycetes. Although, hitherto, no definite proof has been found to substantiate these views, yet the work done has been of considerable service, and the results obtained by some of these observers are highly suggestive of the microbial origin of at least some forms of new growth.

In this paper I will try and recall attention to the fact that there are other factors at work in the production of new growth which, although not perhaps directly causative in their action, at any rate bear an important relationship to the subject. Before entering upon the subject of what one may call the predisposing causes of new growth, I will first enumerate some statistics on the relationship of occupation to the occurrence of cancer.

These figures are taken from the tables compiled by Dr. Tatham, in the supplement to the 55th Annual Report of the Registrar-General. The death-rates from cancer in men aged from 25 to 65 years, in each occupation, are stated as proportional figures, groups of men having the same proportion living at each age between 25 and 65 years being compared, and the result called "Comparative Mortality Figures." Thus stated, the number of males that would give 1000 deaths in the general population in the period 1881-'90 would give 47 deaths from cancer. Among all occupied males the comparative mortality figure from cancer was 44, among all unoccupied males 96.

The following, then, are the comparative mortality figures for each occupation:—Clergymen and ministers, 35; lawyers, 60; medical practitioners, 43; commercial travellers, 63; coachmen and grooms, 58; seamen in the merchant service, 60; dock and wharf-labourers, 51; porters, 48; farmers, 36; fishermen, 46; maltsters, 61; brewers, 70; innkeepers, 53; innkeepers in London, 70; inn and hotel servants, 65; tobacconists, 51; fishmongers, 42; grocers, 34; drapers, 49; butchers, 57; shoemakers, 50; tool and scissor makers, 58; blacksmiths, 45; plumbers, 53; potters, 35; coal-miners, 36; coal-heavers, 56; gas-workers, 59; general labourers, 48; chimney sweeps, 156.

No safe deductions, however, can be made from these figures, for if we compare lawyers with clergymen, two classes whose work is both more or less literary in character, we find that the former are represented by 60, while the latter total only 35. The outstanding feature of the list is the high rate among chimney sweeps, viz., 156. It is obvious that the products of the imperfect combustion of coal have a much stronger predisposing influence towards cancer than the manipulation of the crude products, for among coal-miners the rate is 36, and among coal-heavers it is 56, *i.e.*, in both cases very much below that of chimney sweeps.

And now, by way of illustrating the readiness with which cancerous growths attacked injured tissues, allow me to quote some illustrations.

Bose reports the case of a young man who, while eating some raw trout, perforated his tongue by one of the fish-bones, the bone being broken off and remaining *in situ*. The fragment was extracted 15 days later. Within

a comparatively short time an epithelioma appeared at the site of the injury, and this rapidly spread and proved fatal within 12 months.

Sippel records a case in which, after removal of a cancerous ovary, the growth attacked each of the suture holes in the abdominal wall. I have seen at the Sydney Hospital an exactly analogous case. Waldeyer and Quincke record a case in which the growth spread along the track of a trochar used for tapping a case of cancerous peritonitis.

Then, again, epithelioma has a special affinity for scars, and frequently is met with in those resulting from burns and ulcers. Lengrisk (Dent. Zeit. f. chir. LII., p. 379), in writing on the relationship of trauma to tumour-formation, relates the histories in 31 cases. Twelve were cases of carcinoma and 19 of sarcoma. The ages ranged from 11 to 80 years. In 18 cases the growth followed a single injury, and among these were 2 cases of carcinoma and 13 of sarcoma, in which the injury appeared to be the direct cause. In 13 cases of repeated trauma, sarcoma appeared in 4, carcinoma in 9. In several cases the injury was followed by suppuration. Many more instances could readily be quoted showing the intimate relationship that exists between trauma and new growth.

Now, let me instance some examples of new growth following upon chronic irritation and inflammation. Many examples are seen of tumours arising at points which are the seats of chronic inflammation. Thus, epitheliomata not infrequently are found growing in the edges of chronic ulcers. The parts of the alimentary canal most prone to new growth are those where the lumen is narrowed, and which are, therefore, specially liable to irritation and injury. Such localities are, the two orifices of the stomach, the point where the aesophagus is crossed by the left bronchus, and where the aesophagus joins the pharynx, opposite the cricoid cartilage. Again, the large intestine is much more prone to malignant growth than the small intestine. This is probably due to the more solid nature of the contained fæces, their longer contact with the intestinal wall and their consequent liability to irritate the mucous membrane. The rectum and anus, where this cause would act to most advantage are especially liable. Workers in tar and paraffin are especially liable to epithelioma of the skin of the arms from the irritation produced by the products in which they work.

Thomas Oliver (B.M.J., Jan. 19th, 1901), in an article upon malignant disease of the female genitalia, referring to epithelioma of the vagina, mentions the fact that pessaries too long worn are not infrequently associated with the occurrence of epithelioma. Dr. Parkes Weber (B.M.J., April 20th, 1901), records the case of a man who suffered from a combination of calcules and spheroidal called carcinoma of the pancreas. Albarran (*Edin. Medical Journal*, Vol. IX., p. 90), writing on the subject of malignant epithelial growths of the pelvis and ureters, says that nothing is known as to the aetiology of such tumours, but remarks that it is significant, however, that in 7 out of 32 recorded cases calculi have been found in the pelvis of the kidney. H. T. Butlin (B.M.J., July 13th, 1901) records 3 cases of lenkoplakia or leucoma of the vulva, each of which was subsequently followed by cancer. Crocker and Pernet (B.M.J., Sep. 28th, 1901, p. 864) record a case of epithelioma following upon arsenical keratosis of the palms. Soltan Fenwick (*Edin. Medl. Jourl.*, Vol X., p. 310), in an article on primary carcinoma of the duodenum, points out that the disease is apt to follow upon simple ulcer. At least 10 such cases are on record, and in other cases, more especially in women, the disease is associated with gall-stones.

Pringle (*Brit. Jourl. of Dermatology*, Jan., 1900) records an instance of multiple epithelioma developing in connection with lupus crythematosus. The growth in this case occurred in the scar-tissue, and not in the true lupus-tissue. Repeated irritation, he says, seems to be the direct causal agent in such cases. Cases have also been recorded of the occurrence of epithelioma

in the scar-tissue of lupus vulgaris, and it is also noted that such cases assume a more malignant phase than those occurring after lupus erythematosus.

Adami, in his admirable address on the causation of cancerous growths (B.M.J., Mar. 10th. 1901), points out that bilharzia may exist within the organism for many years without setting up any disturbance; but in those parts which it preferably infests it is capable of setting up cell-proliferation of an adenomatous, papillomatous, or even carcinomatous type. These nematodes live in the radicles of the portal and pelvic vessels and their ova, chiefly by reason of their shape, make their way through the vessel-walls into the mucosa and submucosa of the lower bowel and bladder, and so pass into the lumen of the bladder and bowel respectively.

Numerous cases have been recorded of extensive neoplasms of the rectum and bladder clearly secondary to the continued cell-irritation induced by these ova. This is an example of continued irritation giving rise to tumour-growth, not in cells congenitatly misplaced, but in those which have belonged to strictly normal tissues. I could readily quote innumerable other instances where long continued irritation and inflammation have been associated ultimately with cancer formation, such, for instance, as epithelioma of the lip following upon chronic fissure, and of the tongue following upon syphilitic disease and the use of short pipes; but I think I have already mentioned sufficient instances to illustrate the connection.

Charles Powell White (*Jourl. of Pathology*, Vol. VII., p. 339), writing upon the subject of the theory of irritation, says, "Irritants undoubtedly play a most important part in the causation of tumours. The irritant need not necessarily be mechanical. It may be chemical, *e.g.*, the perverted secretion of a gland, or it may be an antecedent inflammation. It is also quite possible for a tumour to arise without any definite extrinsic cause."

Dr. Nason (B.M.J., May 18th, 1901, p. 1199), writing upon an analysis of 5000 cases of death from malignant disease, says, that although up to a certain age increasing years with presumably decreasing cell activity render the individual increasingly liable to cancer, this is true only to a certain point. Then comes a time beyond which increasing age renders the individual less liable. It looks as though a certain amount of vitality or activity in the special cells of organs were necessary, or at least most suitable, for the production of cancer, and that when this vitality is diminished beyond a certain point, a greater stimulus is needed before a malignant growth can be started. This stage is reached much earlier in the uterus than in the case of the stomach, rectum, or mamma. In the uterus the stage of maximum liability is reached immediately after the cessation of functional activity, and the later years of life are associated with a considerably lessened liability.

In connection with this subject of chronic irritation, it would be as well to bear in mind the ingenious *Theory of Ribbert*, which relates to the intrinsic causes of tumour formation. According to this theory, every cell has an inherent capacity for growth, but this is held in check by the "tissue-tension" of the part. When once this is diminished, the capacity for growth is set free and proliferation occurs. Ribbert holds that fibrous tissue plays the chief part in tumour growth.

Cohuheim held a somewhat similar view, viz., that malignancy consisted in a diminution of the physiological resistance of the surrounding tissues, and thus allowed the tumour-cells to infiltrate and destroy them. It has been shown that in the young the sub-epithelial tissues are relatively more vigorous than those of the adult, and that this relationship is gradually altered as life advances, till in old age the connective tissues become atrophied and the epithelial tissues relatively more vigorous. In this way prolongations of the epithelium are often seen dipping down into the connective tissue area. There is both clinical and experimental evidence to prove that

tumours may be said to originate in groups of cells which have become severed from their natural connections in the body, or, in other words, cells which have thrown off the physiological resistance of the surrounding tissues.

Birsch-Hirschfeld and Gartin injected emulsions of living embryonic cells into the livers of adult animals, and found that in some cases definite tumour-like masses formed. These, however, were ultimately absorbed by the tissues.

Lack set free some cells of the ovary of a rabbit into its pertitoneal cavity, and, as a result, a definite carcinomatous mass appeared with secondary growths. These two sets of experiments appear to prove that free embryonic or epithelial cells set free in the tissues may form tumours. They also seem to throw light on the difference between innocent and malignant growths. In the first series of experiments it was found that only cells from young embryros were capable of the development described; those from more advanced fætuses were merely absorbed by the tissues. This would seem to indicate that for tumours to develop there must be a certain relation between the vigour of the aberrant cells and that of the neighbouring parts. If the free cells are vigorous and the surrounding cells feeble, then a rapidly-growing tumour may develop. If, on the other hand, the tissues be more resistant, then the invading cells will grow slowly and with difficulty, and there will be time for the growth of a capsule. In this way an innocent tumour may grow. Should the tissue-resistance be subsequently weakened, then an innocent growth may assume properties of malignancy. In cases where the tissue-resistance is very strong, the cells are absorbed and not allowed to get a footing at all. A simple injury may, under these circumstances be sufficient to cause the necessary devitalisation of the surrounding tissues. These experiments certainly go a long way to prove that whatever the intimate cause of new growths may be, we certainly cannot afford to overlook the influence of the tissues themselves, at any rate, as regards predisposition. There seems to be a certain degree of analogy between the influence of conditions, such as chronic irritation, injury, and inflammation in the production of new growths, and the predisposing influences we call "depressed vitality" in the production of tuberculosis. Such conditions certainly seem to render the tissues more vulnerable to attack from the materies morbi, whatever it may ultimately prove to be. Such causes, then, must at least be regarded as playing, at any rate, a secondary *rôle* in the production of new growth, and they should not be lost sight of altogether.

The amelioration or abolition of conditions which predispose to a certain disease must surely be of considerable avail in the prophylaxis of such disease. In the treatment of tuberculosis by the methods now most in vogue, and which have produced the best results, it is not the causal organism that we directly attack, but by improving the surroundings of the patient and supplying him with plenty of plain and easily assimilable food and fresh air, we so fortify his tissues that they are able the better to withstand the inroads of the enemy. By such means we make the surroundings unfavourable for the growth, development, and diffusion of the bacilli, and allow the natural defence forces of the body to fully assert themselves. By adopting a similar plan of procedure in the case of new growth we should, I think, be able to render the tissues less liable to attack. By taking means to prevent inflammatory attacks from becoming chronic; by adopting skin-grafting to a greater extent in the healing of burns and ulcers, and by as far as possible relieving the tissues from the baneful effects of prolonged irritation, we would, I feel sure, greatly reduce the incidence of new growth. Such measures can be taken even before the question of the primary cause of new growths has been definitely discovered, and would in all probability be of great prophylactic service.

MALIGNANT DISEASE AND CANCEROUS PROCESSES.

BY

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THE terms "cancer" and "malignant disease" are together responsible for a great deal of discouragement to operative surgeons, and for a great number of premature deaths amongst the sufferers from this disease. They were, and indeed still are, used to imply that the patient possesses a certain constitutional taint in addition to the local manifestation of disease; a taint which, no matter how thoroughly the disease may be eradicated by surgical means—no matter how healthy in appearance the patient may be—is certain in a comparatively short time to lead to recurrence and inevitable wasting and death. This constitutional taint was thought to be almost always inherited, and it was supposed, in some mysterious way, to be the cause of the cancerous process. With such a picture before his mind, how could any patient submit himself to a surgical operation until he was obliged by pain and exhaustion to seek this kind of relief as a last resource? Or, with such a view of the pathology and cause of cancer, what surgeon in the past felt justified in undertaking extensive and dangerous operations? His patient generally applied for relief long after the time when complete cure was possible, and the surgeon too often contented himself with a tentative and hesitating procedure designed to relieve the victim of his more pressing symptoms, but with no thought of permanent cure whatever. The introduction of antiseptic and aseptic surgery—by making the healing of quite extensive wounds a matter of days instead of weeks or months—first led surgeons to undertake the total removal of cancers, which before were thought to be inoperable owing to the size of the resulting wound. When it was found that the size and depth of incision (provided asepsis was rigidly maintained) made no appreciable difference in the time of healing, surgeons became impressed with the necessity in every operation of removing by a wide sweep all the growth. This became the surgical rule, and it was soon found that local recurrences became more and more infrequent as more care was taken to make certain that the whole disease was removed. This suggested the fact that, in the early stages at any rate, cancer is always a purely local disease, and that the constitutional taint which was supposed to be its cause was really due to the exhausting nature of the advanced disease itself. Although local recurrences were thus not infrequently avoided, it was not so with parts further off. No attempt was for a long time made to sever the lymphatics along which cancer disseminates itself, and for long the nearest chain of lymphatic glands were left untouched, to be almost certainly the starting points of new growth. It is now clearly established that however extensively the original focus of the disease has been removed, it is almost sure to recur speedily in the nearest glands, unless they too have been removed at the first operation. It has long, then, become the surgical rule that, whenever practicable, an operation for cancer should also involve the removal of the chain of lymphatic glands in immediate anatomical communication with the original growth. Unless this is done—and it is just as imperative in the early stages as when the disease is far advanced—the whole of the cancer has not been removed, and it would be just as reasonable to expect its permanent cure as it would be to expect the cure of a fatty tumour if a portion of the fatty growth were left behind. Unfortunately, this radical operation (owing to the situation of the original

malignant growth, or because of the inaccessibility of the lymphatic glands) can all too seldom be thoroughly carried out. And herein lies the limit of the successful treatment of cancer by surgical means. Unless the whole disease is removed, no cure with an approach to permanence can be reasonably expected, and in a great many situations where cancer is very frequent the lymphatic glands cannot be got at. I know that this has long been perfectly clear to operating surgeons, but I venture to think that we have not applied this rule in our operations as thoroughly as we ought, and sometimes could. In cases of breast-cancer, I quite admit the operations have been very thorough—the original focus is always thoroughly removed, together with the fascia covering the pectoral muscles—the axillary glands (whether enlarged or not) are always thoroughly cleared out. The consequence is, that in the experienced hands of Mr. Watson Cheyne the statistics of this form of cancer show 57 per cent. of permanent cures. Many surgeons, especially American, do a much more extensive operation than Mr. Cheyne recommends. For instance, they remove a large part of one or both pectoral muscles—they saw through the clavicle to obtain access to the glands of the neck; but I think I am right in saying that these extensive and dangerous surgical procedures do not show a lower rate of recurrence than do the cases reported by Mr. Cheyne.

Although it is true in the main that the earlier a cancer is operated upon the less chance there is of recurrence, this is by no means always so. It would be easy to bring forward numerous instances of early recurrence after operations undertaken for the removal of recently-developed disease, and also cases of long immunity, where the advanced nature of the disease would lead one to fear that a speedy return was inevitable. The following two cases will serve as well-marked examples:—

Six years ago I operated on G.C., aet. 52, for a small epithelioma of his lip. The disease was in such an early stage that I anticipated no recurrence. However, six months after the first operation he returned with a gland the size of a walnut under his jaw; this was removed. A few months later there was another gland deep down in the neck, above the sternal end of the clavicle; this also was removed by a difficult and deep dissection. I thought the glands in the neck would speedily become involved, but although a period of five years has elapsed there has been no return of the growth. When the last gland was operated upon there was no more of the disease left, and therefore there has been no return. This case has encouraged me to remove the glands in communication with the disease wherever possible, and also to dissect out malignant glands, even in cases in which a speedy return of the growths appears certain.

The following is an example of very advanced disease which has shown no tendency to recur:—Mrs. W., aet. 54, presented herself with extensive ulcerated scirrhus of the right mamma, the size of a large soup-plate. The disease had grown rapidly, and had ulcerated for about five months, and was surrounded by much hard inflammatory œdema. It seemed hardly justifiable to attempt any removal, but at her urgent request the whole of the growth was removed, leaving a patch the size of a breakfast-plate to heal by granulation. The glands in the axilla, in spite of the advanced disease, could not be felt through the skin, but the incision was extended upwards, and as many as could be found were removed. They appeared to be quite healthy. After operation the case did splendidly; healing was rapid; and seven years after operation there is a flat white scar, and the patient is in perfect health, with no sign of recurrence. It is very difficult to explain how it is she has escaped. It has occurred to me, however, that possibly the hard inflammatory œdema which surrounded the disease, and which had been there for months, may have so occluded the lymphatics as to make it impossible for the axillary glands to become infected.

It is, I know, dangerous to predict, but I venture to think that, speaking from a surgical point of view, the limits of cure of cancer by the knife have very nearly been reached. Some improvement may be looked for in the methods of removing malignant disease of the intestines, and possibly in the future early carcinoma of the gall-bladder, liver, and pancreas may be more amenable to surgical treatment. At present the principal hope is that our patients and the public generally may be brought to realise that surgical treatment of cancer is not now undertaken as a last resort, or for relief of pain merely, but in the reasonable hope of actual cure. When this is fully realised our mortality statistics in cases of operation for cancer will, we may hope, be very greatly improved, inasmuch as operations will be done at a much earlier period.

CANCER.

BY

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It has been asked of me to give my opinion of the results obtained by radical measures in the treatment of cancer. This is a large asking, and can hardly be answered in terms of cancerous disease generally.

The disease processes which we are pleased to group under the head of "cancer" vary so remarkably in different cases and in different parts of the body, as to render it imperative for us to consider the subject in some detail before we can give an estimate of much value as regards the operative treatment by radical measures of cancer generally. The right valuation is to be found somewhere between the limits of the opinion of the surgeon of twenty-five years ago, who operated in utter want of hope, and that of the ultra modern surgeon, who has a cut at every malignant case he sees. It is far from the first limit, and some distance from the second.

The fog of hopelessness dimmed the horizon of the earlier surgeon, and yet, with his perfunctory procedure, he undoubtedly cured some cases of cancer. The modern surgeon, with his well thought-out operation and his freedom from septic sequelæ, can see mothods whose radicalness approaches the operative limits bearable by the patient; but in the meantime he is very apt to lose sight of the natural history of the disease. It was the fact that his predecessor occasionally scored a genuine success by what we would consider now a very incomplete operation, that induced the modern surgeon to extend the bounds of his cutting more and more widely, in the hope of eradicating the disease, and we must admit that it is a thoroughly rational mental attitude. When our successes in the operative treatment of cancer of the breast, the easiest of cancers from the surgeon's point of view, rose from two and three per cent. gradually through the twenties and thirties to the present forty-five to fifty-five per cent., and this with the gradual and concurrent widening of the operative area, is it any wonder that surgeons seek further success in the direction of further cutting? It is an instance of concomitant variation, which can only be interpreted in one way. It is easy to say that cutting is an admission of weakness, and that we do not cure the disease by mutilating the patient, that our action is similar to that of knocking on the head the man whose arguments we cannot refute. There is some truth in this, of course, but there would have to be a very great deal more before we could give up our great measure of solid success achieved by our attempts at extirpating the disease by cutting.

Many considerations urge the modern surgeon to operation and wideness of operation; he thoroughly appreciates the advances already made, and his memory serves him with cases of very unpromising character on which the strongly-expressed desire of the patient was the chief factor in making him operate, and yet with a cure. The patient of the last generation, in his or her desire to have something done, forced the hand of the older surgeon himself, the very reverse of sanguine, and his desire has survived in the present generation of patients, most of whom, in my experience, would take at much risk a remote chance of being cured rather than philosophically await the inevitable. It is very hard for the surgeon to refuse his aid when he knows there is a chance, though a small one, and if he should operate in such a case at all, he must operate widely. Every surgeon is much pleased and more astonished at the excellent results he occasionally gets in cases in which his hopes were of the smallest, but the solicitations of the patient of the greatest.

These cases are not very few, and though harm is undoubtedly done by operations for malignant disease which approach the class injudicious, this is more than made up, I believe, in individual successes, and the lesson that radical procedures are capable of removing with lasting success cancers of most unassuring aspect. Let me give an instance of this: a man of 56 years wore an ill-fitting tooth plate, which hurt him and caused an ulcer behind the last molar tooth and at the junction of the dental arcades; this, spreading, had, when I saw him, developed into a large epitheliomatous surface, which embraced the original ulcer, the tonsil, anterior pillar of the fauces, and more than half the width of the soft palate. No glands could, however, be felt anywhere. I refused to operate at first, but at the repeated importunity of the patient, who suffered much and constant pain, I did, performing a large operation, which has ended most happily, as for two and a half years he has exhibited no return, and no infection in the glands has appeared. Much of the success in the case, which gave assurance of little, was due to the anatomical possibility of removing the part *in toto*, the whole thickness of the soft palate being taken away. The disease was superficial and fairly rapid in its spread, and there was no doubt as to its nature, as Dr. Mollison pronounced it to be epithelioma microscopically. It must be remembered, in this case, that it is well known that cancers of the soft palate give better results by operation than cancers in the neighbourhood. Such unpromising cases must give us pause ere we refuse our skill to patients so afflicted. To the older surgeon all cases were unpromising, and if we could have fathomed his mind, probably they were all labelled "hopeless"; with us, of course many are still unpromising, but we frequently think and speak of cases as "unfavourable."

It is the optimistic frame of mind which has been largely helpful in our reaching our present level. We have several indices as to whether a case appears favourable for radical cure by operation—such as the age of the patient, the short time the growth has been noticed, the absence of palpable glands, &c.—but the only real test of a favourable case is that no return of the disease should occur.

Now, we know that many cases which cannot be classed as favourable by appearance are so by the test of time, and cases that seem favourable, as far as we can judge before operation, grievously disappoint us. This is notably true of breast cancers. Thus, this very uncertainty as to which cases are really favourable turns us in the direction of operation, and of wide operation.

Yet another type of case commands our attention in this regard; it is where recurrence *in situ* appears fairly soon after the original operation, and even after several further removals, but where, ultimately, a cure seems to be effected, and the patient's life is certainly definitely prolonged. The following is an example of this:—Some 12 years ago a patient consulted me about her breast, which showed a cancer decidedly worse than the average case. I operated by a fairly-extensive method, and was mortified to find a return beside the scar in less than four months; this I removed, and during the next five years was obliged to accomplish small operations for little nodules in various parts of the neighbourhood of the cicatrix. I then lost sight of her for years, until the courtesy of a resident surgeon at a midland hospital in England prompted him to write and tell me that she had been admitted for another disease, and that subsequently to mine, other small removals had taken place, and that at the time of writing, between nine and ten years after the original operation, she seemed free from cancerous disease. This case is analogous to those of sarcoma where a succession of operations eventually wears the disease out. There is at present under my care a lady whose breast was removed nearly three years ago for carcinoma by another surgeon. About 15 months ago I removed the remaining breast for cancer,

and also a little nodule near the first scar at the same time. Some three months after this again, two small nodules appeared along the site of the first incision, and were promptly removed. In spite of this wide area of cancerous deposits, refusal to operate would have been very wrong. The lady is in excellent health, and her life, I am sure, has been prolonged in health by these operative measures. The presence of the so-called cancerous cachexia in a patient acted as a deterrent to the older surgeon; with us it may sometimes be an incitor to operation. The condition of cachexia, which is a short way of saying that a person looks ill, feels ill, and is ill, was thought by our predecessors to be due to the presence of metastatic growths; now we know that this may be the case, but it is not necessarily so. The primary chronic cancer may so poison the system as to kill the person by its presence, quite apart from discharges from hœmorrhage or from mechanical effects. Remove the growth, and even though it may eventually return, you remove for a time at all events the ill-feelings, the ill-looks, and the illness of the patient—a number of times have I seen this happy change follow the operation.

A parallel clinical condition is seen in cases of large syphilitic gummata. The patient wastes, loses health and strength, and will die of the presence of a large gumma. Start its disappearance by cutting into it, finish its removal by appropriate medicines, and the patient regains his health, weight, and strength. Look again, how a boy with a rapidly-growing periosteal sarcoma will look like a healthy boy again, if only for a time, after the amputation of the limb carrying the growth. I think there is much to be said for removing the growth as a poisonous centre, whose toxic effects are probably seen in atrophy of internal organs, quite apart from secondary deposits.

The longer the primary cancerous focus has been in existence, the more likely is there to be a change in the internal organs, quite separate from any secondary growths. This change may have reached a stage which forbids the recovery of a patient after a severe operation. Thus, a condition of cancerous illness should be an inducement to the surgeon to operate if the cancer has not been present very long, but in very chronic cases it should deter us, in my belief. The carcinomatous growth as a poison-manufactory is an aspect of the disease which may be borne in upon us more strongly in the future with advantage.

To speak once more on the conditions in which operation is so useful, I would remind you of those in which the diagnosis between malignant and other morbid phenomena is not evident. These cases are by no means few. Look how often cancer is simulated by numerous other diseases in the abdomen; how cases unoperated on may go to their graves labelled abdominal cancer, when they were suffering from a remedial condition, such as hydatid, gall-stones, syphilomatous masses, or peritoneal adhesions of a gross character. Here we may miss a great success by taking too dismal a view of the probable condition, and although abdominal cancer is apt to be worse than it feels, and further advanced than the history suggests, it may be the reverse, and we are able to perform a valuable and hopeful operation in spite of the malignant nature of the disease.

Thus, we have a number of rational inducements to operate, a number of subsidiary reasons for using the knife; but the grand inducement, the overpowering reason for operating, is that in a number of cases we can cure the disease outright.

Whilst the surgeon is improving his technique and increasing his percentage of cures, there is much—very much—which he craves from teachers of anatomy, both normal and morbid; there is much of the highest practical importance to be learnt yet of the lymphatic distribution of each of the great cancer areas. Each organ wants more special study of its anatomy as regards the course of growth of its own cancers. Whatever the cause of

cancer may be found to be, whether there be more causes than one, the cancer or each organ will have to be worked out by itself in the light of the new knowledge.

A good example of the importance of a knowledge of the natural history of the disease is to be found in rectal cancer. It takes the surgeon some time to appreciate how few of these present a really fair field for his skill, and how long the patient may live with a malignant growth in and around his lower bowel. A medical friend was attended by me for a rectal cancer which had, in my opinion, been in existence for a year or more before I examined him; he lived for 6½ years after this, most of the time in comparative comfort. I feel sure that no operation would have lengthened his life or added to his comfort; in fact, the reverse would most probably have occurred if he had submitted to a radical operative measure. Again, surgeons often pride themselves on their patients having lived three, four, or five years after the rectal removals, forgetting that such a lengthy period is probably the natural one in rectal cancer. Here, as much as anywhere, I think, will a philosophic abstaining from operation redound to our credit and the best interests of the patient. On the other hand, in suitable cases, which most likely do not amount to more than one in four, operation gives most excellent results with but a very small risk, even if a moderate bone-removal is included. A cancer which can be reached by resections of the coccyx, and removed freely in such a way as to allow of the junction of the bowel ends, and of course the saving of the sphincter, is not common, but when the surgeon does meet with it he can offer his patient a very happy prognosis after a very neat operation. When we recognise fully that the natural history of rectal cancer is marked by only the slightest symptoms for some time, that these may be not in the smallest degree obstructive, and that the disease may and often does choose quite young men, we shall meet with more cases which are well adapted to most successful and scientific radical measures. Again, the natural history of glandular infection is not so apprehended in its clinical entirety as to have become part of the routine of our minds. We now naturally examine the anatomically correlated sets of glands, but we should most certainly, in all cases of suspected cancer, especially abdominal, seek for evidence of enlargement and hardening of all peripheral glands. We certainly have formed a habit of feeling for the left subclavian lymph-glands in vague gastric cases; and so we ought, as it is nearly 50 years since Virchow told us of the connection between cancer of the stomach and hardening and enlargement of these glands. But we can hardly be said to have acquired the practice of intuitively seeking the cervical glands, the axillary glands, and the mesenteric and iliac lymph-nodes in cases of suspected cancer at a distance from these. These cases are rare, but their recognition will save useless operation, as when a person develops a glandular hardening in a lymph series other than that anatomically adjacent to the primary growth, a very few months of life is all that is left to him.

The whole question of glandular enlargement is still fraught with difficulty and uncertainty to the surgeon. The presence of hard isolated glands in relation with a cancer is by no means a contra-indication to operation; to my mind it is advantageous to find them hard and distinct in a case where cancer has existed for some months. It is not easy to keep one's mind from striving to erect an analogy between enlargement of glands with cancerous elements and enlargement of glands containing tubercular elements, and again, typhoid elements. The cases of breast cancers where recurrence or new evolution of the disease occurs many years after the removal of what, I think, is the primary disease, are best explained by supposing that the carcinomatous elements can remain dormant in the glands for a long period of time, to regain activity from some loosening cause, even as tubercular and other elements start into activity again after, it may be, many years. Surgeons

do not fear these hard, bullety glands, which can be removed with a good atmosphere of fat around, but they do look with fear upon glands whose capsule is not so defined—whose feel is as of a diffuse body; and so much do they dread soft, semi-fluid glands that they often wisely refuse to operate for their removal. Midway between this, the enlarged succulent gland, with but little fibrosis, is not an encouraging sign. Yet, little can we lay down the law clinically upon glandular enlargement in cancer, when the older surgeons have reported cases of cures, rightly so-called, where the tongue was removed for cancer and enlarged glands left. It is fairly easy to apprehend why duct cancers of the breast do not affect the glands for some considerable time (I have just removed one of them in which the glands were involved), and to understand how early and certain is the infection in epithelioma of the mouth and tongue, but the relation between the primary and secondary glandular growths is often very obscure, and yet it must be of great importance in our decision as regards operating, could we but understand it. How is it that in some cases the secondary tumours in the glands are of so much more importance than the primary? Look at the big masses in the neck which one hardly dares touch, and yet the parent-growth tucked away in some recess in the pharynx is of so insignificant a nature as to elude our search, often entirely. Some observers believe that the lymph gland can and does act as a defender of the organism generally—that carcinomatous elements are prevented from growing, and even disintegrated by the vital processes of the gland—while others look upon the glands rather as forcing-houses, where increased virulence of the cancer is produced. Unfortunately, as in so many questions connected with cancer, clinical experience furnishes support to both these apparently opposite views; I am afraid that more importance attaches to the varying virulence of the cancer element than to the varying resistance of the patient. It certainly seems in many cases as if there were a distinct resistance in the gland which the carcinomatous elements take some time to overcome but when they do, cancerous growth proceeds at a great rate.

Look how unsettled questions connected with glands crop up in connection with the most elucidated surgical field, viz., that of the breast. Does the presence of enlarged supra-clavicular glands when a patient has cancer of the breast negative our operation or but incite us to wider effort? Personally, I now think it contra-indicates operation, my own experience being anything but encouraging in such cases, and I was much interested in observing in Sir William Banks' recent paper Mr. Plimmer's opinion that he had never known anybody live long after distinct invasion of the supra-clavicular glands with cancer. My efforts at extirpating the disease in this awkward region have but disseminated it locally in at least three cases.

How much is to be yet learned of the natural history of malignant disease in relation to traumatism. We all know how inflammatory conditions coming on after injury should subside after a time, and yet we often fail to appreciate the vast importance of the swelling, which should have gone, and yet lingers after a traumatism.

Even in the most hopeless of cancer areas—the tongue and the floor of the mouth—steady progress is being made; but we still have to admit that our art is in advance of our science. I have operated a good many times for cancer of the tongue, and, thanks to our improved technique, especially in covering the raw surface of the mouth, the operation has never ended fatally, and the immediate result as regards the comfort of the patient has been excellent; but I can only point to three cures, and one of these has not quite turned the three-year limit.

In spite of a gradually-increasing percentage of cures in cancer of the mouth, is it not true that we should save more lives by our recognising the vast gravity of various diseased conditions which stand in the life-history of

the patient from the time his mouth was perfectly healthy to the establishment of the cancer? We all appreciate the value of a clean mouth, which has no ulceration and no epidermis changes, but it gives us pause when Fournier tells us on apparently excellent evidence that lenkopakia in the mouth, whether it be syphilitic or not, undergoes cancerous degeneration in at least three per cent. of cases.

To turn to a happier field of our operative labours, what a glorious chance to do most useful and artistic work presents itself to the surgeon who has the opportunity of operating on a ring cancer of the colon, or of the small intestine. If there is as yet no obstruction, or if the obstruction has been provided for by a previous operation, the surgeon knows that his patient has a very excellent chance indeed of recovering from what is a most skilful operation, and an excellent chance of being entirely rid of his disease. Here I would state myself as a very warm advocate of exploratory abdominal operations in cases which do not improve with medical measures after a reasonable time; abdominal cancer is so largely latent as regards symptoms for so long, as to justify us in operating in suspicious cases much earlier than we do. A small incision in the middle line, or, what is often more satisfactory, the formidable-looking but really innocent method of entering the abdominal cavity introduced by Abbe and Mayo Robson. What a pity it is that we wait for a gross tumour to be felt before advising operation, and even then the free mobility may deceive us into delay. By the time a definite tumour is obvious, the case has advanced far; by the time this tumour has ceased to be moveable, the disease has gone very far indeed—so far, that a rule has been formulated which negatives operation where there is no free mobility of the tumour. Even here is the uncertainty which attaches itself to all cancers. Three years ago, to see what could be done, I opened the abdomen of a man aged 42, who had a fairly-fixed mass in the right iliac region; it turned out to be a carcinoma of the cæcum, and when the abdomen was opened it could be moved much more freely than external manipulation would suggest. After some hesitation I removed the cæcum, part of the ileum, and of the ascending colon, joining their cut ends with a Murphy's button; the transverse meso-colon also was denuded of its glands. Being rid of this poison-centre, the man speedily regained the two stones in weight that he had lost, and is now, I believe, in excellent health and strength, working on his farm. This was certainly an unpromising case, and the observance of a hard and fast rule would have deprived him of what proved to be a very excellent chance. One great cause of the still high-reported mortality of operations for cancer on the large bowel is, that the surgeon finds great difficulty at first in deciding whether the case is a fair one for operating on; and when he has furnished himself with enough evidence as to what to do, it may then seem better, having done so much, to proceed with the radical operation, although a previous knowledge of the condition would have prevented him operating at all. It is here where we want our greatest moral courage to desist, when we appreciate that a little less disease would have allowed us to perform a brilliant operation, with probably a highly successful result. In cancer of the intestinal canal especially do we seek the early co-operation of the physician. If he waits through months of slight but suspicious symptoms until a definite tumour is to be felt, our successes will rise but little higher than they are now, a degree which it is almost impossible to estimate accurately with the statistics to be reached at present, but when patients are subjected early to an intra-abdominal inspection, the results of intestinal cancer, which at first is not a particularly malignent form, will rise high indeed, our art will allow few to succumb from the effects of operation, and our diagnosis, made early by means of an inquiring cœliotomy, will give the surest earnest of a diminished ratio of recurrences. To show how far our art is ahead of our

diagnosis, we need go no further back than the last *Lancet*, where Mr. Rutherford Morison gives the after-history of five cases where he had performed successful pylorectomies, and yet recurrence had killed each one after varying intervals. Each one of these exhibited at the time of operation a distinctly palpable tumour, but there must have been a time before the possibilities of palpation presented themselves, when carefully-sought symptoms justified a surgical inspection with the right of radical operation.

From this pinnacle of operative zeal I would like to descend to a surgical, and, I think, philosophic calm. If we thought of the natural history of atrophic cancer, how very seldom we should operate. It is a well-known, and not very uncommon, variety in the breast. We know that atrophic cancer almost always wakes up eventually, it may be after many years; sometimes apparently spontaneously, sometimes after an attack of acute disease, *e.g.*, influenza. But will not operation wake up the distant foci which are so frequently associated with atrophic cancer, the spinal nodules, and other bony carcinomatous colonies. The surgeon's vision is here apt to be too accurately local, for he is apt to forget that the little shrivelled-up old woman with the little shrivelled-up atrophic cancer of the breast has most probably little shrivelled-up internal organs, which will stand no strain. There are, I feel sure, many reasons for the letting the sleeping dog of atrophic cancer lie; sometimes he will bite back locally. I well remember when a colleague of mine, by a free amputation of the leg, removed a carcinoma which had appeared at the site of an old ulcer of the leg in an aged woman. The cancer returned rapidly in the stump,, and then in a second stump, and then in the infimal glands, and yet it had been sleeping for many years before, what we must call, the interference of the surgeon. We must be prepared in atrophic cancer for a sudden outburst, but operation may just hasten it. It is well, I am certain, before operating for the removal of a cancer which has existed for more than the usual time, to weigh the probabilities—they are only probabilities, of course, of distant disease, and the chances of waking it up. An operation in such a case may be the solvent which allows the secondary growths hitherto, as it were, crystallised, to become fluid again. There need be no sepsis to do this. May not the natural increase of lymph which results from so gross an injury as the modern removal of the breast be sufficient to vitally alter the equilibrium in all glands, and even in foci in bone?

Again, how much we want to know of the relation of previous inflammations and neoplasms to cancerous activity. There must be a strong relationship, *e.g.*, chronic mastitis, in a middle-aged woman, is a condition few of us care to leave to finish its history without interference. Paul has just told us how more and more impressed he is each year with the connection between chronic inflammatory changes and tumour-formation, and I think most surgeons are of his thinking. A retrospection will summon up to our minds so many "lumps," whose early removal would have saved cancerous development.

I believe we may say that the experience of Australian surgeons is similar to that of surgeons in other parts of the world, and with them having to fear only shock, which we can combat, and secondary deformity, which we can diminish, we shall go on from present to increasing success; but I do not believe we shall ever show an absence of British operative sanity. There are limits exceeded in some cases beyond which common sense no longer accompanies the operator. It is hardly science, and certainly not art, to leave a patient as if some of nature's journeymen had made them, and not made them well.

SOME ASPECTS OF CANCER.

BY

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In contributing my part to this important discussion, I shall confine myself to the results of my personal observations and reflections, and refrain from a reference to the various theories which obtain at present, and are become the common property of all through their dissemination in text-books and journals. It seems to me that it is only by eliciting the original work of members that Medical Congresses are fulfilling and justifying the chief aim of their existence.

What I have to say may be brought within three propositions, all of which I dare say will accord with the experiences of others, although the deductions therefrom will no doubt lead to a wide divergence of opinion.

1st. Cancer is a disease of old age, or, at least, of the decline of life. A quarter of a century ago this statement would hardly have required any modification, at least, in the case of carcinoma. And even yet it remains in great part true, and in accordance with the universal experience, although the exceptions are numerous and perplexing.

This position granted, it follows that, if cancer has its origin within the organism, it must arise in the decline of life owing to the tissues having undergone some subtle change predisposing them to the exciting cause of the disease. If, on the other hand, the disease is introduced from the outside by means of microbes, as many now believe, the fact of its being so prevalent in advanced life would show that the system has then lost some vital power or property, which at an earlier age formed a protective barrier against the invasion of the outside factor. In either case, therefore, some degenerative change in the organism is necessary before cancer can be established therein. The all-important question, therefore, is—"What is the nature of such change"? Perhaps we shall be able to throw some light on the obscurity before we have finished. But first, "What is my experience of the heredity of cancer"? In very many cases where an accurate history could be given, cancer has been known to be present in one or more generations. On the other hand, many cases have occurred in which no history of previous disease could be traced. On the whole, therefore, I am not disposed to attach much importance to heredity, or to consider it more than a tendency or predisposition. Perhaps the fairest way to put it would be to say that, in some families slight provocation will induce cancer, while in others the strongest provocation would never induce it.

Let me relate one instance of cancer of the kidney (primary) occurring in a young woman in the prime of life, who came from a stock exceptionally long-lived and healthy. She was 33 years of age; her parents are still living, close on 90 years; all her brothers and sisters are living, in perfect health, and now of mature age (nearly 60, some of them); her uncles, aunts, and cousins all showed a similar healthy record. She herself was of a strong and robust frame, and for a year after her illness commenced her case was regarded as anæmia only, and it was only within a few weeks of her decease that her strength so failed that she was obliged to take to her bed. The P.M. showed that the disease commenced in the right kidney, then invaded the liver, then the peritoneum (spreading over from right side to left), and was just attacking the left kidney when death supervened. Now, here is a very instructive case. First, because attacking a woman in the prime of life, of splendid constitution and history, and in an organ that is very rarely the primary seat of the disease.

2nd. Cancer is a disease that has a marked preference for certain organs or seats. In women, the breast and uterus are most frequently assailed; in men, the stomach and rectum, tongue, and lips. This is valuable as indication of the predisposing cause, and may also throw light on the exciting cause. Hitherto, the explanation of the incident of cancer upon some organs more than upon others has been that it attacks most readily such as are exposed to irritation through excess of function. This is notably true in the case of women when it attacks the mamma and uterus, and in men when it attacks the lips and stomach. But is it the whole truth?

3rd. My experience has taught me to connect the onset of cancer in a very special and marked degree with some powerfully depressing cause—a mental shock, or a reverse of circumstances. This is particularly the case when it attacks women. In by far the majority of my cases such a factor has been existent; therefore, I do not look upon this as a mere coincidence. Let me relate one or two cases. A woman, who had been a patient of mine for some years, and who enjoyed splendid health, brought her daughter to me for an irregularity. On examination, I was obliged to tell the mother that her daughter was pregnant. I hardly ever saw any one suffer so severely and so immediately from the shock, and it was a considerable time before she could leave my rooms. About six months afterwards she returned to consult me about herself—the first time she had ever required my services—and I scarcely could recognise her. She was emaciated, and with a marked cancer cachexia. On examination, I discovered the disease in the rectum. She dated the decline of her health from her knowledge of her daughter's fall. A lady who had an only son and one married daughter, and who had always enjoyed exceptionally good health, was forced to consult me. I diagnosed cancer of the stomach of a very severe type. On going into the history of the case I learned that she had enjoyed good health until about eight months before, when her son's affairs became public through bankruptcy proceedings. These were particularly disgraceful, and gave his mother, a proud and honest Scotswoman, a profound mental shock. From that occurrence she did not enjoy a day's good health or mental repose. Now, cases like these may be multiplied *ad libitum.* Of course, it may be said that the disease was already existent in the system, and that the mental shock only aggravated and accelerated it. That is so, although only conjectural, and has no more solid basis to rest upon than the other theory. The truth may be discovered when numerous observers everywhere have their attention directed to this point. Suppose it is true, in what way could mental shock act so as to produce cancer? Through the nervous system, surely, either cerebral or ganglionic. This would give a remote instead of a local origin to cancer, and would consequently mean that our studies hitherto have been misdirected. How would this theory of nervous origin tally with the other facts of the case? The health of the remotest and minutest parts of the body depend upon healthy nerve-influence. If the brain-centre supplying any organ or parts has its vitality affected, this must interfere *pari passu*, with the parts it supplies. It is for the physiologist to determine whether a profound mental shock, such as I have described, affects the brain as a whole, or only some parts of it, or some parts in greater degree than others. If some areas of the brain can be proven to be more affected by shock than others, the next question to determine is, "What parts or organs of the body do these areas supply"? If the organs affected by cancer are also found to be organs supplied by such areas, one step in the chain of evidence would be established. Then it would be necessary to carefully dissect the nerves in any part affected with cancer up to their origin, and by microscopical examination determine if any departure from the normal condition could be established. If so, then another important step in the investigation would be established. If no such chain

could be discovered, it would be reasonable to argue, as we do at present, that mental shock acts as a factor in producing cancer only in so far as it tends to reduce the general vitality of the individual. But I must confess that the close connection between the evolution of cancer and mental shock has led me for some years to surmise that there is a closer connection between cancer and the nervous system than has been dreamed of in the past. And it might not be barren of great results if the studies and observations of physiologists and physicians were directed somewhat closely to this point.

MEDICINE.

ON THE SIGNIFICANCE OF THE TERM "CURE" IN MEDICINE.

BY

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POPULAR beliefs and superstitions are very often survivals representing, with little substantial change, the opinions of the wise and learned of some earlier time. This is certainly true in respect of medicine, and it may well inculcate modesty and caution on those who think that they have attained to the ulitmatum of truth. For, is there reason to suppose that our scientific doctrine and practice will stand the test of time better than did those of our predecessors? But, if there is something humiliating in the thought that the science of one generation is the folly or superstition of the next, there is also some comfort to be derived from the fact. The unfeigned faith in the efficacy of medicine, as it exists in the popular mind, may sometimes serve as a consolation to the physician, when weighed down, as he often must be, under a sense of his own helplessness. If more is expected from him than he can possibly accomplish, and if he is unfairly blamed for failure, which he could in no way avoid, he sometimes, perhaps as often. gets credit for results which were entirely due to Nature's operations. But, to the true physician, this is, after all, rather a poor consolation, and when depressed from a sense of failure he may be tempted, as religious persons also are in these sceptical times, to look back with regret on the bygone ages of faith. For it may be said, I think with truth, that a hundred years ago, or even more recently, most medical men cherished almost as complete confidence in the curative powers of medicine as does the most uncultured layman of our own day.

The history of medicine is not by any means one of steady progress, in which, with constant growth of knowledge, there was equal improvement in its practical application. In the writings of Hippocrates, we meet with views which might almost be described as modern. He devoted special attention to the natural history of diseases, and laid great stress on the importance of prognosis, which can be based only on a knowledge of the natural course. He was in advance not only of his own time, but of times not very remote from the present, in holding that all diseases take their origin in natural causes. According to him, there was nothing less than impiety in the doctrine that any disease is sent as an affliction from the gods. It is further evidence of the rational nature of his opinions and practice, that he devoted attention in large measure to the regimen suitable to different classes of diseases, and studied the influence of climate, water, and locality in producing and causing variations in the character of diseases. So rational, in fact, were his teachings, that it may be said that the whole period, from his time down almost to the last century, was one of comparative darkness. There doubtless were at all times physicians belonging to what might be called the Hippocratic or rational school of medicine; but they prevailed little against the ignorance and superstition by which they were surrounded. Leaving aside exceptional cases, we may say that, up till at least the end of the first quarter of the nineteenth century, the medical mind was deeply, and I may add, honestly impressed with the power of therapeutic measures in determining the course of a disease, and, indeed, in actually bringing about cure. And it was, above all, in drugs, and active procedures such as venesection, that this confidence was placed. When the physician was assailed with

satire, it was not because of his belief in drugs and other active measures, but on account of his supposed ignorance and rashness in the use of them. One of the chief causes, which led to the growth of a feeling of doubt as to the power of medicine to produce cures, was undoubtedly the rise of homœopathy. It was not that Hahnemann himself was sceptical of the powers of medicine, and his more orthodox followers even now err rather in the direction of credulousness. But those who could not accept the fundamental doctrine of homœopathy, *similia similibus*, or its peculiar mode of practice, the use of infinitesimals, had often to admit that results as good as their own were obtained by its practitioners. But, if doing what was tantamount to nothing had as good results as doing much, it was manifest that the progress of the disease could not have been materially influenced for good by either method. And if Hahnemann did not succeed in converting the medical profession to his peculiar doctrines and practices, his work was not on that account of no effect. His speculations and experiences did indeed influence the progress of medical science, though it was in a way that he dreamt not of. If the first effect was to encourage a spirit of scepticism, which became almost absolute, especially in some of the schools of Germany, that scepticism did not remain barren. The best physicians of the time had the feeling that, if they could not do much in the way of directly curing disease, they could at least try to understand it. The first thing needed was to return to the Hippocratic standpoint, and study the natural history of diseases, so as to know their causes, and modes of termination when subjected to the minimum of interference. For how can a man tell, with any approach to certainty, what the effect of his treatment will be, or has been, unless he was able to foresee, and if needful, predict, what the progress of the case would have been if he had been content to do nothing? A large field of inquiry was thus opened up, and the spirit in which that inquiry was entered on was revealed by the very titles of certain journals, founded by some of the leaders of medical science in Germany. There was the *Archiv. für Physiologische Heilkunde*, and the *Zeitschrift für Rationelle Medizin*, both founded in 1842; the latter by the famous anatomist, Henle, in association with Prof. Pfeuffer, a well-known physician. If it be true that a scientific knowledge of the nature and causes of morbid processes is the essential basis of sound practice, it is manifest also that, to most men, the chief pleasure and satisfaction in their study must lie in the hope that, with increase of knowledge will come increase of power in the direction of therapeutics. And no one, entitled to speak at all, can now say that the study has been barren of such practical results, or that the physician can only stand by as an interested spectator, while the body is struggling with the disease by which it has been attacked. The results have already been considerable, and we may confidently hope that the means at our disposal, for dealing effectually with many forms of disease, will yet be largely increased. Indeed, the most recent tendency in therapeutics is rather toward over-activity, especially in the way of treating symptoms; the administration of powerful drugs being made almost too easy by the improvements in pharmacy. But though the spirit of scepticism is no longer dominant, the established principles of therapeutics are not so numerous or so fixed as to put aside altogether the inquiry, whether there is any such thing as a cure of disease, in the sense of a restoration to health, actually brought about by artificial means.

Whatever may be the causes by which disease is set up, diseases themselves are states of the organism, disturbances of normal physiological processes. And, just as the organism is subject to constant changes, so diseases must be, to a greater or less extent, subject to variations. It is this variability, this constant waste and renovation of the structures of the body, which makes cure or recovery possible. Worn out materials are removed, new cells take the place of old, and in this play of vital processes lies the

very possibility of the cure of disease. It may have had a manifest external cause, but in its essence disease is only a modification of natural organic processes, and cure, again, in its ultimate essence, must be accomplished by similar processes. The fluids and tissues of the body have undergone some change, which we describe as pathological, and their incessant renewal alone gives the opportunity of a return to the normal physiological condition.

This is not to say that art may not intervene, and, by the removal of injurious agents or influences, give that turn to events which determines the occurrence of cure. But, it is only in the constant recognition of the fact that medicine is Nature's handmaid and helper, that her function can be at once safely and effectively carried on. And further, it is only in a knowledge of Nature's own methods of cure that we can find a rational basis for our own therapeutic endeavours.

Let us see what these natural processes of cure, in their main outlines, are.

The symptoms, by which a disease is recognised, being representatives of a chain of organic processes, dependent on the cause in which they took origin, it is to be assumed that they will not come to an end so long as the cause continues in operation. It does not follow, however, that removing the primary cause, or rendering it ineffective, will suffice to produce a cure. A wound remains after the bullet has passed on, and the skin remains scalded after the hot water has cooled. Still, removed the cause must be, or at least rendered inactive, before the disturbances which it set up can be cleared away. Often, after the cause has ceased to operate, there are results which in their turn become causes of a secondary order—swellings and effusions of various kinds and abnormal adhesions of parts, for instance. Cure may be very imperfect, unless these secondary causes can also be removed. Then there are what may be called accessory causes, influences of a more or less accidental kind, which have an opportunity of coming into operation, because of the antecedent conditions. Among these are to be mentioned, the infecting agents (bacteria), which find admission at any breach of surface, but would have been harmless but for the operation of the primary cause. Among accessory causes may be reckoned, further, conditions not injurious to the healthy, but doing harm to a diseased part because it has become a weak spot. The ordinary wholesome food of the healthy stomach may do serious harm to the deranged organ; and a trifling chill or over-exertion may cause serious break-down of a damaged kidney or heart. So the inflamed joint will not bear movements, or the inflamed eye exposure to light or even moderate use. It is, above all, in the recognition of accessory causes of disease, making obvious the existence of conditions of a morbid kind, previously latent, that modern medicine has gained its chief triumphs.

Too often we can judge of the primary cause merely from its effects, but for secondary and accessory causes we can always be on the watch. The more we know of them and their modes of operation, the quicker we are in recognising the conditions which favour their action, the better prepared we are to deal with them, both for prevention and cure. So it is that when a diseased condition, whatever its nature, does not advance properly towards recovery, after the primary cause may be presumed to have ceased, we ask as to the reason, and most frequently it will be found in the coming into activity of one of these accessory causes.

The agents or forces which act as causes of disease are manifold, and the body has to adopt many modes of rendering them inoperative. Against extremes of heat and cold, or sudden or greatly increased physical strain, and against poisons of many kinds, the system has capacities of adaptation, or powers of resistance, that are actually marvellous. It is of extreme importance that the true character of these adaptations and resistances

should be properly regarded, lest we may be tempted to interfere with them, possibly to our patient's hurt. If we insist on regarding as a disease what is properly a reactive effort of nature, we may be fighting against that which has a curative end in view. Terminology is often partly at fault, and we carry on, under old names, conceptions which are really obsolete. We talk of jaundice as if it were a disease, and so perhaps fail to search diligently enough for the condition of which it is a mere symptom, a result, or an accompaniment. Constipation and diarrhœa are habitually spoken of as if they were essential diseases, though it is more correct to regard the former as a physiological adaptation, and the latter as representing a curative effort. When, also, will we cease to speak of inflammation as if it were a disease, and not a mere manifestation of vital activity in resistance to some irritant? Of course the disturbing influence may be too powerful to be overcome by Nature's own endeavours, and art may, with advantage, intervene. But next to the search for causes, and hardly secondary to it in importance, is the physician's unwearied out-look for signs of Nature's own curative effort, to be followed and aided, but on no account to be hampered or counteracted.

About conditions of the kinds just indicated, I can only speak in generalities. But there is a class of noxious agents whose action deserves special discussion. The body serves as a suitable soil on or in which many kinds of parasites may live and multiply. Of the larger of these, parasites in the stricter sense, whether animal or vegetable, it has to be said that, when they have once gained a footing, the system, left to its own powers, is in most cases virtually helpless. It is only by the intervention of medicine that intestinal worms can be expelled, or parasitic diseases of the skin cured, in the great majority of instances.

But the agents which produce so many acute and chronic infective diseases stand on a different footing. They are chiefly of the lower order of vegetable organisms, and so minute that their presence is first revealed, not by their individual appearance to the eye, but by the effects they produce. These are not merely of a local kind, for bacteria have such power of rapid multiplication, and of diffusing themselves or their products in the fluids and tissues of the body, that severe effects of a general kind result.

Unless modern medicine is completely on a wrong track, minute organisms are the cause of by far the most of the dangerous diseases to which human beings are subject. The list of these infective diseases is steadily increasing, and even where full proof has not been supplied, we are often led, by almost inevitable inference, to assume that bacteria are the actual and efficient cause. In whatever other ways bacteria may manifest their pathogenic influence, it is now generally believed that the chief and most characteristic symptoms are due mainly to specific poisons, which they produce. With regard to most of these diseases, and especially in the case of the acute infective forms, it is evident that the body, though for a time seemingly overwhelmed by the invasion, has extraordinary powers of recuperation. Unless death takes place quickly, the multiplication of the invaders is checked. They are killed or expelled, or in some other way rendered innocuous, and complete recovery as a rule takes place. Sometimes, of course, effects remain, in the form of local structural alterations, which may last long, and ultimately prove more serious than the original affection. Such are, for example, the kidney and ear complications and sequelæ of scarlet fever; but the rule stands good—death or complete recovery.

Few questions in medicine have excited more attention, or are of more genuine scientific interest, than the inquiry into the method by which acute infective processes are brought to an end by the native powers of the organism. The process of recovery is in part easily understood. The poisons formed, whether directly produced by the bacteria themselves, or as by-products in the breaking down of the tissues, are steadily being destroyed, or are

carried off by the kidneys and other organs of secretion. But it is now known that the destructive or expulsive action of the organs and tissues is largely helped by antitoxins, apparently the products of reactive cell activity. These neutralise the toxins, perhaps by entering into chemical combination with them. As regards the poisonous products of bacterial action, we can say that their injurious effects are first kept in check, and ultimately brought to an end, by a combination of destruction, elimination, and antidotal neutralisation.

As to the bacteria themselves, the question is, if possible, even more complicated. Some are killed by some constituent of the blood and fluids of the body, possibly a normal albumen, the so-called alexin; others are taken up and destroyed by the cells; many escape by the various excretory surfaces; while others again may long remain in various parts of the body, incapable perhaps of doing further injury to their host, or only producing local effects of a more or less harmful kind.

So much is known about the natural process of cure or recovery, in the most successfully investigated class of diseases. And it is evident that the process is extremely complicated, and one which we can hardly hope to imitate fully in any kind of artificial or medicinal way. It is possible, of course, that the natural method is not always so complicated as that described, even in some of the acute infective diseases; but it may be well for the present to confine ourselves to that which we best know.

And in connection with diseases of bacterial origin, another point has recently been carefully studied; though, as a mere fact, it has been a matter of observation from time immemorial. Persons who have passed through an attack of certain infective diseases, have thereby acquired an immunity from further attack, more or less complete, and possibly of life-long duration. The same thing may be accepted as true of certain of the diseases of animals, and opportunity is thus given for exact experimental inquiry. This condition of immunity, or at least of lessened susceptibility, clearly depends on some alteration in the constitution of the fluids, or in the active properties of the cells, or it may be of both. It may be taken as the persistent remnant of a defensive mechanism, called into operation by the reaction of the tissues against the bacteria and their products.

Our knowledge, on the subject of the nature of mechanism of immunity, may be described as taking its origin in the Jennerian vaccination against smallpox. It first supplied proof that immunity can be acquired, without the necessity of passing through a fully-developed attack of the disease to be guarded against. Though Jenner's discovery seemed long to remain barren of further results, modern experimental methods have now carried us far. It is generally believed, in accordance with Jenner's original opinion, that cowpox is really smallpox greatly modified, and the serum from the cowpox vesicles an attenuated form of the true smallpox virus. And if we have not yet discovered modified and mitigated forms of any other well-known infective diseases occurring in nature, we have discovered methods of obtaining an attenuated virus of several of them. We thus possess vaccines in use against various forms of disease—typhoid, cholera, and plague; the best-established, perhaps, being the Pasteurian inoculation against hydrophobia. But the use of any living virus, however carefully treated, is liable to be attended with risks; and, when the bacteria of the virus can be artificially cultivated, it is possible to get the toxin which they produce separated from the living bacteria, and thus in a safe form, with proper dosage. Still another method of obtaining protection consists in the injection of blood serum, from a person or an animal, which has acquired immunity and has completely recovered. This is a more rapid and essentially safer method than either of the others, and its advantages have been notably shown in the case of diphtheria. The

effect is ascribable to the mixture of antitoxins and allied bodies left in the blood after the acute attack had passed off.

The passage from the prevention of disease, on the Jennerian principle, to its cure, or at least its mitigation, after infection had actually occurred, was an obvious one. It had been long suspected that some change in the constitution of the blood was the accompaniment, and probably enough largely the cause, of the spontaneous termination in cure. The suggestion, that the injection of blood serum from a recovered case might have a curative effect, was quite a probable one, though its accomplishment on any proper scale was not feasible until the method of producing artificial immunisation of animals was discovered. The use of antitoxin serum in the treatment of diphtheria has supplied a triumphant demonstration of the fruitfulness, in most practical fashion, of pathological experiment and research. Even as an isolated fact it has enormous value, but it is far more, since it opens up quite a new path of inquiry. It allows us to cherish the hope that, before very long, any or all of the acute infective diseases may be rendered amenable to treatment in a similar way.

But it also supplies demonstration of the principle that, in all our therapeutic efforts, we should imitate as closely as possible Nature's own curative methods. Probably in every case of acute infective disease a spontaneous effort at cure is made. But it may be insufficient, because the amount of toxin produced is so great that the protective mechanism breaks down, and the antitoxin is produced too late or in insufficient amount. By the use of the antitoxin serum an extra supply of the needful antidote is provided, and thus recovery is made possible, or greatly hastened. The use of antitoxin in diphtheria is not merely the empirical application of a new and powerful remedy. It stands for the introduction of a new principle, and entirely new method into therapeutics, for the full fruit of which we may have to wait, the fruit itself being certain. There does not seem to be the same opening for the use of either vaccines or curative serums in the chronic infective diseases. They have not the self-limiting power seen in the acuter forms, and therefore no definite natural method of cure to be imitated. However powerful Koch's tuberculin may be in either of its forms, and whatever its value for diagnostic purposes, it is generally believed to have failed as a curative agent. The same doubt holds with reference to the remedies of the serum order, introduced by Maragliano and others.

The possibility of putting an end to infective processes by the administration of medicinal agents belonging to the class of disinfectants or bactericides, has been and probably will long be discussed. Great difficulties stand in the way of its accomplishment, and if the problem of disinfecting the intestinal canal is by many declared to be insolvable, it is plain that the disinfection of the blood and fluids of the body, as a whole, may almost be despaired of. But if the protozoa of malarial fever can be destroyed, or their growth at least inhibited, by means of quinine, there may surely be other medicinal agents discovered, capable of acting in a similar way in other forms of disease.

Of late years, the question has been seriously raised whether the febrile process, as marked by an elevation of temperature, may not be part of Nature's curative effort. The risks attendant on the pyrexial state, simply as such, were at one time undoubtedly exaggerated. In discussing the true significance of fever in disease processes, a few points have to be considered: —

(1) Very much, both in the way of symptom and of organic change, that was once ascribed to it, is in reality produced by the actions of toxins.

(2) Certain pathogenic organisms have further been shown to have a very limited power of growth, at temperatures not many degrees over the normal point. The critical fall of temperature, in such diseases as pneu-

monia and relapsing fever, suggests or admits of the explanation that the crisis is due, at least in part, to inhibition of bacterial growth, when a range of temperature injurious to the particular organism has been reached or long enough sustained.

(3) Lastly, there is the occasional observation that chronic infective diseases, such as phthisis, take a favourable turn, apparently as the result of an intercurrent attack of some other disease of an acute febrile kind.

The points adduced may not supply full proof of the innocuousness of the febrile state, not to say of its actually beneficent influence. But they do inculcate caution in the use of powerful antipyretic methods, especially by means of drugs, lest we may find ourselves interfering with and hampering Nature in her own curative efforts. I make a clear distinction between drug antipyresis and that by means of cold or tepid baths or spongings, since these may do good in ways quite different from any mere forcing down of body temperature. No mere antipyretic process, or combination of processes, can be regarded as in any proper sense curative. To some extent they may be useful in a symptomatic way, but then there is nothing more dangerous, or essentially more unscientific, than the habit of using powerful remedies for the relief of symptoms. It is a habit which we are all tempted to follow, not only from the comfort which it often provides to the patient, but by the constant introduction and recommendation, by supposed authorities, of new synthetic preparations. We have ever to bear in mind that just as no mere grouping of symptoms makes up a true diagnosis, so no mere treatment of such symptoms can constitute a true or scientific method in therapeutics. Causal conditions must be discovered, and causes themselves attacked, or there can be no cure. Till that can be done, we must hold ourselves bound by the maxim, "See at least that thou do no harm."

The method of treating disease by means of animal extracts, though in a way of old date, has received great development of late years. We owe its use, in modern form, to Brown-Sequard's doctrine of the importance of the internal secretion of glands. His own beginnings, with orchitic extract, were somewhat unfortunate, but they contained the germs of a therapeutic method, which has now obtained great extension. That organic extracts, derived from the structures of many glands, have powerful physiological properties is now clearly established. The best known and most carefully investigated are those derived from the thyroid and supra-renal glands; and their study and application have been followed out more easily, in a purely scientific way, because previous lack of knowledge about the true function of the glands prevented the growth of charlatanry, which so easily attached itself to the use of orchitic and ovarian products.

We are still greatly in the dark about the true physiology of internal gland secretion. Until there has been great development of knowledge from the purely physiological side, any advance must be very much in the groping way. The most pronounced and indisputable therapeutic success has been obtained with the thyroid and para-thyroid extracts. Supra-renal extract has a powerful action on the vascular system, but it has not been shown to exert much, if any, influence in removing the complex of symptoms which we call Addison's disease. Extract of pancreatic tissue has not well-defined properties, and it certainly does not cure the diabetes which is associated with loss of the pancreas. As for the splenic, cerebral, renal, and other extracts, which enterprising manufacturers have placed at our disposal, definite knowledge and application are almost entirely lacking. The theory of use of these extracts is that they provide an agent, perhaps of the nature of a ferment, which supplies something lost to the body by the absence or functional insufficiency of the gland. By supplying it we are doing very much the same thing as supplying food for the cure of starvation, and there is little more cure in the one sense than in the other. But if I seem to speak thus in a

depreciating kind of way of thyroid and other forms of organic extract medication, it is not really so. The introduction of the method marks an enormous step forward in therapeutics, and what we can accomplish by its means at present is but a trifle compared with the results which may confidently be anticipated. But properly looked at, it is merely a following of Nature's guidance, and supplying her with help in a difficulty into which she has temporarily or more permanently fallen. It is a further proof that medicine, in marching to its position as a science, must be cleared of mystery, and made to rest on its basal sciences—chemistry and physiology.

It is the popular belief that every disease must or should have its specific remedy, if that could only be found out; and, indeed, the reproach against medicine, in the popular mind, is that it has had such small success in the discovery of these specific remedies. This popular belief, once the cherished doctrine of leaders of thought, has to some extent had its justification in these serum and organic extract methods. They will doubtless find much wider application in times not distant; but still the teachings of the school of physiological medicine, that true progress did not lie in the way of a search for specific remedies, have also had their full justification. All that has been gained, and probably all or most that is yet to be gained, is and will be the result of patient inquiry into the nature and causes of disease processes. And our resource, while more specific methods are still lacking, must be in the practical adaptation of physiological principles, with such assistance as can be got from drugs, whose properties have been tested in the laboratory or at the bedside.

The best illustration of this truth, as it is at present one of the most interesting, is to be seen in the modern treatment of consumption. From the scientific use of rest or properly regulated exercise, open air life in a pure atmosphere, and a full supply of nourishing food, results which would once have been declared impossible are now obtained. Very often they are attained without the help of drugs, but, under certain indications, unmistakable help can be got from creasote, guaiacol, and other remedies. And in many other diseased conditions, both acute and chronic, very much can be done to bring about recovery, to bring about, in fact, what is tantamount to a cure, temporary or permanent. The functions of the stomach and intestine can be regulated, the excretory capacities of the skin and kidney stimulated, the heart's action strengthened, and vascular tone heightened or lowered. More food can thus be assimilated, the quality of the blood improved, and its distribution favourably influenced, and the escape of waste and poisonous material made easier.

The period of sceptical inaction has now been over-passed, and there is no disease, however obstinate or malignant, which we may not cherish the confident hope of yet being able to overcome. We do not at all despair of yet finding some means of effecting the cure of cancer, that most dreaded of human ills. For, if the myxœdematous state, with no natural tendency to recovery, can be removed, and if syphilitic growths can be caused to disappear by means of mercury or iodine, why should the tissue change which we call sarcoma be insusceptible of cure? In the same way, if acute processes like rheumatism and malarial fevers can be kept in control by salicylic acid and quinine, how can we give up the hope of controlling other conditions of an allied kind?

We enter on the new century with the hope and expectation of triumphs even greater than those which have marked the period just passed. The last half-century has been marked by the great progress made in surgical science and practice. But, while admitting this, physicians have often had difficulty in preserving patience, under the claims advanced on its behalf. To judge by the utterances of certain surgeons, their art was fairly in the way to render medicine almost obsolete, and surgery certainly has almost taken

possession of certain fields of practice, once reserved for the physician's care. But, we are in the way to regain much of the lost ground; and, in so far as medicine has made advances, they have been of a kind far more satisfactory than those of the surgeon. For, surely the removal of organs, or the cutting of large sections out of the body, is a rather poor way of effecting a cure. And, taking it at its fullest, the progress of surgery in recent times is traceable almost entirely to two things, neither of them in any special way surgical, the discovery of anæsthetics, and the recognition of the need of scrupulous cleanliness. The former made haste unnecessary, and the latter allowed the exploration of any region or any cavity. After that, there remained only sufficient development of handicraft. Time was when surgery was the humble servant of medicine, and the day may be not far distant when they will again be in the same relative position. Or, would it be fairer to say that, in the coming time, we will all be physicians, but some having, and others lacking, an aptitude for the procedures and manipulations now called surgical?

But, to return to our original question—is there any cure other than that which Nature herself effects? The answer, I think, may fairly be Yes. We can effect genuine cures by removing causes of diseases, killing or expelling parasites, or putting an end to sources of irritation, or by counteracting or getting rid of poisons which have entered the body or been produced within it. In many of these cases the natural efforts by themselves fail to take effect, and art must intervene if there is to be cure. The cause being removed, it of course remains for the natural forces to bring about recovery from the effusion, ulceration, or other results which have in the meantime been occasioned. For certain diseases of the infective order, and others due to gland destruction or derangement, we can come to Nature's help, in such a way that cures are produced, where her more tardy efforts would have come too late. Where we seem to produce a cure, almost entirely by means of drugs, as in the case of syphilis or malaria, we are doubtless coming to Nature's help in a similar way, though her own part in the process is not yet clear.

These are the most striking instances of actual cures for which we can claim credit. But in very many other cases much can be done by a judicious combination of general and pharmaceutical methods. Take the distressing symptoms which arise in many forms of chronic cardiac disease. By means of rest, purgation, diuresis, and improvement in the vigour of the heart's contractions, and of the tone of the vascular wall, results that might almost seem miraculous are of every day production. We cannot of course say that they represent absolute or permanent cures, since the cause of the whole train of symptoms remains, be it valvular disease or degeneration of heart wall or vessel. To the patient at least it represents a cure, and for the time being we may take it as such. By whatever name it goes, cure or respite, recovery or mere alleviation, to medicine it is due, Nature having manifestly exhausted her resources. And in instances of analogous kind, and almost numberless, the physician who takes physiology and pathology as his guides can do great deeds for the benefit of suffering humanity, not merely in the way of alleviating symptoms, but of removing morbid states.

I started with defining cure as a recovery produced by artificial means, whether in supplement of Nature's own efforts, or more independently of them. It may surely be claimed that evidence has been fully supplied of the occurrence of such cures, even with our rudimentary knowledge of disease in its very nature and essence. And these are but the first fruits of a great harvest which the new century is destined to reap.

TUBERCULIN AS A SPECIFIC REMEDY FOR PULMONARY TUBERCULOSIS.

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Tuberculosis of the lungs is the commonest and deadliest disease that afflicts mankind, especially in civilised communities. It is so common because for generations the very nature of the disease has deceived and disarmed mankind, and even now-a-days, in spite of the certain knowledge of its infectious nature, methods of prevention that are generally adopted in plague and similar diseases are neglected, or applied in a perfunctory fashion. It is so deadly because, in the majority of cases, the disease is well established before it is recognised. Turban tells us that, of 418 cases, only 11 came for treatment within a month of the appearance of the first symptoms, 103 within six months, and the majority, 305, only after six months had elapsed. In the first group (11), permanent results were obtained in 72·7 per cent.; in the second group (103), in 67 per cent.; and in the majority (305), only in 40·2 per cent. How important early diagnosis is, and how rare. Whatever method of treatment we practice, whether rational, specific, or other, early diagnosis is the key to high success. Twenty years ago the early diagnosis of pulmonary tuberculosis was, at most, guess-work. Some correct diagnoses were made, but many mistakes. Cases of actual disease were overlooked, and healthy lungs were pronounced to be weak. After Koch's discovery in 1882, the test of tests was the demonstration of tubercle bacilli in the expectoration by certain stains. For many years this test dominated everything. Progress in knowledge has deprived even this test of most of its value. Valuable in certain cases in which the physical signs are absent or misleading, and in mild cases of mixed or concurrent infection, notably in influenza and pneumonococcal and streptococcal infections, the discovery of tubercle bacilli in sputum by certain stains too often fails when it is most wanted. It fails as a test in early diagnosis, because the presence of tubercle bacilli in the sputum is itself a sign that disintegration of tissue has occurred. The great lesson of the last decade has been the paramount importance of detecting pulmonary tuberculosis in the first stage—before tubercle bacilli escape into the air passages by the disintegration of the superficial tubercular lesion—while, in fact, the tuberculous formation is still closed, or, in other words, shut off from the external world, represented by the air passages. Moreover, Koch and his pupils have taught us that, in the great majority of cases, the tubercle bacilli play a relatively subordinate part in the severer forms characterised by fever, sweating, and wasting. By the light of Koch's methods, as applied by Kitasato and Pfeiffer, we have been guided to a clearer and truer understanding of the variable picture that pulmonary tuberculosis presents to us in its manifold stages and phases. I admit that among English authorities there is still a strong tendency to look askance at, if not to disregard and belittle, the modern view of mixed infection, secondary infection and concurrent infection. The term "mixed" infection—so full of light and meaning—was first used by Koch's distinguished colleagues, Ehrlich and Brieger, in 1882, in describing a case of typhoid fever complicated with malignant œdema, but Koch, himself, was the first to recognise the condition in pulmonary tuberculosis. In his own monumental work upon the Etiology of Tuberculosis, one reads thus—"The combination of bacilli and micrococci as they appear in this disease belongs to the mixed

infections, the existence of which appears to be by no means rare." In this case the infection was rather a concurrent than a mixed infection. There was an invasion of cocci from an ulcer in the mouth, in a case of miliary tuberculosis, running a rapidly fatal course.

The role of infection independent of the tubercle bacillus—sometimes mixed, sometimes secondary, sometimes concurrent—occurring in any stage of tuberculosis of the lungs, may defy exact measurement by clinical methods; but now-a-days it is hardly possible to over-rate its importance when bacteriological methods are called to our assistance. Diagnosis, prognosis, and even treatment demand a careful differentiation of the elements constituting these other infections. A careful analysis of these elements by recent methods is an important, perhaps the most instructive, basis of classification. Physical signs may mislead us in diagnosis and prognosis; symptoms may help us to distinguish the acute, the sub-acute, and the chronic—the treatment varying accordingly—but a discrimination of cases by the resources of bacteriological science gives us a basis at once definite and trustworthy. The full meaning and importance of mixed infection did not develop until the genius of Koch, which had guided and inspired the investigations that culminated in the production of the diphtheria antitoxin, proposed a new method of treating tuberculosis on an equally scientific basis. The treatment of tuberculosis with tuberculin is specific. It is of no avail except for tuberculous diseases, and, if other complicating conditions exist—if other micro-organisms are associated with tubercle bacilli in the morbid process—tuberculin may fail absolutely to assist or modify the morbid process; indeed, tuberculin may then do harm, and perhaps even hasten a fatal issue. I fear that many men have learnt to their cost and at their patients' expense, that tuberculin may be powerful for harm and powerless for good when the chief cause of the symptoms is not the tuberculous process at all, but the various infectious processes that may be quite beyond the physician's range of vision. Tuberculin treatment aims at a progressive process of active immunisation, radically different from the passive process, in which antitoxic serum is supplied ready made. The passive process of immunisation may be exploited with impunity and under any conditions; active immunisation, on the other hand, makes a larger demand upon the energy of the tissue cells, and requires that the cells and tissues should be in a relatively healthy state. In the presence of various micro-organisms, such as streptococci, the energy of the cells may be so depressed that active immunisation by means of tuberculin cannot be expected. Tuberculin treatment, therefore, has limits unknown in the antitoxic treatment of diphtheria. The failure of tuberculin in 1891 was due to a disregard of the limitations and restrictions laid down by Koch himself, and to a general ignorance of the rôle of mixed infection in pulmonary tuberculosis. It was not that Koch's announcement was premature; it was rather that medical men, by a bitter experience, discovered themselves exploiting a remedy without having had the training essential to success. Failure in their hands was a foregone conclusion, and tuberculin as a remedy for tuberculosis had a mere mockery of a trial. The key to successful treatment with tuberculin, is a proper selection of cases by means of bacteriological methods, or, these failing, by a judicious use of tuberculin itself as a diagnostic agent. There is, indeed, no royal road to success in the treatment of pulmonary tuberculosis, either by specific, rational, or other methods. Each case requires skill, judgment, experience, and, in no small degree, patience; and after all the best and most conscientious efforts may be baffled by the intervention of conditions that can be neither foreseen nor prevented. Indispensable to success is a thorough knowledge of the variable, complex, and treacherous condition, mixed infection. This mixed infection may even parade itself in the garb and trappings of health. As a rule, fever is the danger-signal, and strongly suggests a secondary or mixed infection. Yet, in spite of the existence of fever, there may be no mixed

infection, as in acute tuberculosis and in those rare forms of acute gelatinous caseous pneumonia which Fraenkel and Troje have so well described. On the other hand, fever may be absent, and yet mixed infection, with all its evils and dangers, may be imminent. Nothing short of a careful and thorough examination of the sputum by the methods of Pfeiffer and Kitasato gives us unimpeachable evidence of the presence or absence of a mixed infection. Such an examination should and must go hand in hand with specific treatment. Other methods of treatment may be independent of this fundamental knowledge, but in tuberculin treatment an analysis of the infectious processes at work is indispensable. It is impossible to judge fairly the merits of tuberculin treatment, if we disregard the element of mixed infection. Mixed infection made shipwreck of the tuberculin treatment in 1891. By a fatal fortuitous coincidence tuberculin as a remedy for tuberculosis was tried when influenza raged in Europe as a violent epidemic. Altogether apart from tuberculin treatment, the high rate of mortality from pulmonary tuberculosis in the influenza years proves that influenza was a very dangerous mixed infection in tuberculous disease of the lungs. If, perchance, tuberculin had been used, the tuberculin was blamed. Tuberculin has been condemned mainly, if not entirely, on the investigations of 10 years ago. It was not known then that, although tuberculin might fail, and even do harm when influenza or other infection complicated the tuberculous process, tuberculin might do nothing but good when such complications were absent. I was fortunate enough to use tuberculin in some cases before influenza invaded Australia, and my limited experience seemed to prove the undoubted value of tuberculin, if it were used under conditions prescribed by Koch himself. But, while tuberculin can and does act favourably upon the uncomplicated tuberculous process, it may do nothing but harm in the presence of a mixed infection. Close upon five years ago I used these words—"Pulmonary tuberculosis, as we see it, is rarely a simple process of uncomplicated tuberculosis. It is a process variable in its nature, in its clinical manifestations, in its morbid anatomy, and in its course; and these variations depend upon the virulence of the tubercle bacilli, the state of the tissue, and also on the number and character of the organisms that complicate the simple process due to the action of the tubercle bacilli. Now, these variations, in their manifold clinical phases, have been analysed by the more exact methods of scientific inquiry, and in consequence, method and clearness replace the confusion and vagueness that characterised our hitherto conception of the disease. Such an analysis, even for clinical purposes, may almost exhaust the methods of bacteriological research. The phases and stages of pulmonary tuberculosis largely depend upon the manifold combinations embraced in mixed infection. Let me say, too, that certain infections of the lungs, that have nothing to do with the tubercle bacilli, may simulate tuberculosis of the lungs. This is especially true of influenza, and of infections due to streptococci or pneumonococci. Such cases cannot be benefited by tuberculin. In my own experience, two striking cases are worth recording: I made a *post mortem* examination on a man who died of some obscure septic process. The sole obvious lesion was a small abscess of the size of a hazel nut in the apex of the lung. The pus yielded in the smear a streptococcus, and in the growth on agar a pure culture of streptococcus longissimus. From the spleen, which was swollen and engorged, I obtained a pure culture of the same organism. Is there room for doubt that the primary infection attacked the lung? Even more pertinent is the second case, of a brilliant young medical man who fell a victim to his excessive loyalty to duty. He consulted me once, and once only, for chest trouble with cough and expectoration. For some time he had had irregular fever—sometimes as high as 101° or 102°. Physical signs were practically negative; at most, there were some suspicious auscultatory signs at the right apex. The sputum contained no tubercle bacilli, but I obtained therefrom an abso-

lutely pure culture of streptococcus longus. I was inclined to the view that he was suffering from a mixed infection of tubercle bacilli and streptococci. Cases enough are recorded in which the tubercle bacilli do not get into the expectoration in the early stages of these mixed infections. As the fever persisted, an injection of tuberculin could not be given. If it had been given, it might have been held responsible for the sad issue of the case. In spite of my advice, this man continued at his post for some weeks during as bad a bout of cold rainy weather as I have ever known in Sydney. Then he went to the country for some weeks. He returned to town, and was carefully tended by his regular physician. I saw him but once, a month before he went to the country. He developed septic endocarditis, and died in the course of some months. Surely this was a case of primary infection of the lungs with streptococci, which spread thence to the endocardium by the pulmonary veins. Is it not possible that in many cases of cryptogenetic septic endocarditis the infective agents enter the system by the air passages? I know of no record of a similar history and nature. Thus, septic infection of the lungs may simulate pulmonary tuberculosis. Far more frequently these infections supervene upon the primary tuberculous process. Streptococci, diplococci, staphylococci, and micrococci are ever at hand to complicate the tuberculous process. Influenza bacilli, bacilli pyocyanic, and the bacilli pseudo-diphtheriæ may also complicate. In 1899 I isolated pure cultures of the influenza bacilli from six cases of pulmonary tuberculosis. This year I have examined no less than nine cases of so-called influenza, and in eight cases obtained a pure cultivation of a streptococcus, in one case of adiplococcus lanceolatus. There has been, according to my investigations, no true influenza in the recent epidemic. One may call it influenza from its clinical characters; but the frequent complication of true croupous pneumonia is a fair clinical proof that influenza bacilli have not complicated the process. Thus, acute, and especially chronic, bronchitis may be due to concurrent infection of the bronchial passage, causing apical catarrh, and this primary infection of the bronchial mucuous membrane may end in a mixed infection. In mixed infection the streptococci are intimately and inseparably associated with tubercle bacilli in the tuberculous lesion, as Spengler and others have shown, both by special examination of the sputum and by examination of the diseased tissues, in fatal cases. The tuberculous lesion has, of course, disintegrated, and tubercle bacilli are also found in the sputum. A mixed infection may cause only mild symptoms, especially if there is much fibrosis of the lungs, or may suddenly cause the signs and symptoms of acute phthisis with bronchopneumonic exudation. This is important, and teaches a further lesson. Streptococci and pneumonococci may attack a tuberculous as well as a healthy lung; but in both, the fatal disease is the same. Is it right, merely because tubercle bacilli are found in the sputum, to make the diagnosis of acute tuberculosis? This is often done, especially during streptococcal and pneumonococcal epidemics. *Those who see only tubercle bacilli in the sputum may err egregiously in diagnosis.* Hæmorrhage may complicate a pure tuberculosis or a mixed infection, and may thus be either the first sign of a simple uncomplicated tuberculosis of the lungs, in which the hæmorrhage may be even a favourable sign or the early symptom of a form of acute phthisis due to mixed infection, and running a rapidly fatal course. As a rule, the supervention of the mixed infection leads to wasting, loss of appetite, and sweating, accompanied by fever of varying degrees. The clinical picture changes when a mixed infection is superadded to the chronic tuberculous process. Then, the tuberculous lesion may extend rapidly and soften; tubercle bacilli may be numerous or scanty in the sputum; the expectoration is greatly increased, and swarms with other and various organisms. Kitasato's or Pfeiffer's method readily evolves order out of the chaos of this flora. In 1891 the effects of the mixed infection of various sorts—influenzal, streptococcal, diplococcal—were ascribed to tuberculin.

The lesions to which Virchow specially directed attention in fatal cases that had been treated with tuberculin, were actually the lesions that commonly occur in severe secondary infections when no tuberculin has been used. The simple oft-recorded fact, that death occurred within a few days or weeks of the injections of tuberculin in 1891 proves incontestibly that tuberculin was used in hopeless and totally unsuitable cases. Thus the brilliant success of the few was placed in total eclipse by the disasters that followed the rash and indiscriminating use of the remedy by the many. Ten years of patient work and careful observation have hardly succeeded in rehabilitating tuberculin among the useful remedies for tuberculosis. Professor V. Schroetter told the Congress in London in so many words, that the work upon tuberculin as a remedy in tuberculosis would have to be done all over again.

Those who use tuberculin must above everything beware of mixed infections. There is no time to discuss the question of mixed infection. Those who use bacteriological methods to their full extent will be convinced in less than a year of the supreme importance of the condition. Those who disregard the lessons taught plainly by the best bacteriologists will hardly listen to any arguments of mine. "They have Moses and the prophets: let them hear them." My own experience in 1891 told me that in tuberculin we possessed a specific remedy of great value in suitable cases. My first experiments were made upon patients who were living in a country Sanatorium, and were free from fever. But the general wave of condemnation overwhelmed me in its flood, and it was practically impossible to persuade anyone to undergo specific treatment—at any rate, until all other methods and remedies had hopelessly failed. Then, unfortunately, the stage for tuberculin treatment had long passed. Tuberculin was condemned in the *post mortem* room, was condemned by many after a hasty and illogical trial, and now-a-days, is especially condemned by medical men who have had no experience with it, and the laity, whose ignorance is quite excusable. "Tuberculin treatment has been abandoned in Europe"—so said an authority at a recent meeting in Sydney. Gratuitous assertion should have no weight in the balance against extended experience. I do not wish to escape criticism, but I have a right to demand a careful statement of facts and statistics from the experience of those who have used other methods of treatment. I challenge those who believe in the rational system of treatment to compare their results with the results of scientific treatment in competent hands. The immense value of tuberculin as a diagnostic agent has been proved in animals. In animals also the curative value of tuberculin in its various forms has been proved by Kitasato, Pfuhl, Spengler, and Beck. These experiments show that even the old tuberculin, which was hastily condemned, not only as useless, but harmful, has a decided effect in checking the progress of tuberculous formations, and in causing in them those very changes that are recognised as positive signs of the regression of the morbid process. In guinea pigs inoculated with virulent tubercle bacilli, an ulcer that persists till death forms in the second week at the seat of inoculation, and the animal dies in eight to eleven weeks. In guinea pigs treated with tuberculin, the ulcer healed and the animals lived five, six, seven, and nine months after infection, though the control animals died in six, seven, eight, and eleven weeks. Kitasato writes—"I was able to convince myself with the greatest certainty that even tuberculosis of the lungs had been influenced in a decidedly favourable way by the tuberculin treatment." He adds—"In the case of those guinea pigs, five in number, that are still alive seven months after infection, the inoculation ulcer is at length completely healed, the lymphatic glands, previously swollen, are no longer to be felt, the animals have steadily increased in weight, and have in all respects the appearance of healthy animals." Moreover, these animals were again inoculated by Koch. The second inoculation ran the following course:—Some days after inoculation the tissue round the seat of inoculation was

swollen and indurated. In a week this indurated part was detached by spontaneous necrosis, and exposed a fresh-looking granulating surface. This ulcer was fully healed within 12 days from the date of inoculation, *an event that never occurs under ordinary conditions.* The second infection had no further effect. These results were repeated by Spengler. But the use of tuberculin as a remedy has passed the experimental stage, and various observers, notably Rembold, Krause, Petruschsky, Spengler, and Turban, speak very favourably of tuberculin, and do not record a single case of generalised tuberculosis after its use. Rembold began as a sceptic, but his own results converted him. He waited for six years before he collected his evidence upon the value of the old tuberculin. Out of 70 cases, 27 were cases of mixed infection. Of the remaining 43, 16 were in an early stage, 15 of moderate degree, and 12 in an advanced stage. Of the 12 advanced cases, 2 were improved at the end of six years; the rest died. Of the 15 cases of moderate intensity, 8 were alive at the end of six years, all of them improved; one case was cured. Of the 16 cases in the early stage, 1 died four years after treatment; the rest were alive, 3 greatly improved, 12 permanently healed—*75 per cent. cured.* In these cases judgment was withheld till six years after the treatment.

Krause gives a full account of the treatment of 27 cases treated with old tuberculin. Twelve cases were temporarily healed, 13 improved, one lately under treatment *in statu quo*, and one was made worse by injudicious use of the remedy. Krause says—" We come to the conclusion that tuberculin, rightly used, would have given exclusively favourable results."

Still more important are the records of Turban, who is one of the first authorities in Europe upon pulmonary tuberculosis and sanatorium treatment. Turban's classification of the stages of pulmonary tuberculosis is now largely followed. He recognises three stages. It will serve a useful purpose to include this classification as it appears in Weicker's important work, " Beiträge zur Frage der Volksheilstätten."

TURBAN'S STAGES OF PULMONARY TUBERCULOSIS.

	Pathological.	Physical Signs.		
		Percussion.	Auscultation. Breath Sounds.	Râles.
Stage I.	Bronchitis, Peribronchitis, scattered foci in one apex. *No or little expectoration.* (Often no tubercle bacilli in sputum.)	Normal to slight, want of resonance over area of one lobe or over half of two lobes at most.	Harsh, weak vesiculo bronchial or broncho vesicular over one or both apices.	None, or crackles fine or medium, over area of altered resonance.
Stage II.	Bronchitis, Peribronchitis, infiltration of slight degree over both supraclavicular and supraspinous or marked infiltration of one lobe *exclusively*.	Decided localised dulness over one lobe or some moderate loss of resonance over half of two lobes.	Harsh to broncho-vesicular breathing over dull areas.	Râles of medium quality.
Stage III.	All cases more advanced than Stage II.	Pronounced dulness may be tympanitic note. (Cracked pot sound.)	Bronchial Tubular Amphoric	Metallic, coarse râles, &c.

Cases between I. and II. marked I.-II.
Cases between II. and III. marked II.-III.

Turban treated 21 cases in Stage III. with turberculin. In 8 there was tuberculous laryngitis, 9 cases survived five years, 3 more remained alive four years. Only 5 out of 21 died within two years—25 per cent.; only 1 died of miliary tuberculosis, and that six and a half years after treatment; none died of hæmorrhage. Hence, tuberculin does not increase risk of hæmorrhage, nor of generalised tuberculosis. Three were quite well six years after; in all, 5 were well. Tubercle bacilli disappeared from the sputum in 4 cases. Of cases treated in other ways, 61 out of 84 died—5 from hæmoptysis, 3 from tubercular meningitis. Forty-one out of 84 died in less than two years—nearly 50 per cent. Compare this with 25 per cent. under tuberculin treatment. Forty-eight cases in Stage II. were treated with tuberculin. Nine died within two years of treatment, 3 in three years and more; 16 were alive six years after treatment; 5 more five years after treatment; 3 more four years after treatment; in all, 36 were alive. Thus, of 48 cases, 36 were alive and 12 dead. Of 152 cases healed in ordinary way, 45 were dead and 107 alive; but the figures show greatly in favour of tuberculin treatment, because, out of 107 cases, 49 cases have been no longer than two years or less under observation. Twenty cases in Stage I. were treated with tuberculin. Tubercle bacilli present in sputum in 17. All were well—10 of them six years after treatment, 2 more five years after, 1 more four years after, 3 three years after, 2 two years after, and 1 one year after treatment. *In all, the tubercle bacilli disappeared from the sputum.* The 3 cases giving no tubercle bacilli in sputum had to pass through the ordeal of the tuberculin reaction. On the other hand, 57 cases, in which tubercle bacilli were not found in the sputum, were treated in ordinary ways. They were not subjected to the tuberculin test. Of the remaining 22 cases, there was 1 death, and in 2 cases tubercle bacilli were still present in expectoration. Turban, himself, says—" Now, if we compare the results of early cases in which tubercle bacilli were found in the sputum, the result is substantially in favour of tuberculin treatment (wesentlick zu Gunsten der Tuberculin-behandlung).

" Of the 86 cases with tubercle bacilli in the sputum that were treated with tuberculin, 45, *i.e.*, 52·0 per cent., gave a permanent result; of the 241 cases with tubercle bacilli in sputum that received no tuberculin, 95, *i.e.*, 39·4 per cent., gave a permanent result. Still more distinctly does the effect of the tuberculin show itself, if we ask how many of these cases are now free from tubercle bacilli in sputum? Of the 86 tuberculin patients, 41 are now free from bacilli—47 per cent.; of the 241 not treated with tuberculin, only 66—27·4 per cent.

These are very weighty words from an independent observer. Thus, with tuberculin in the hands of Turban, permanent results were obtained in a much greater proportion of cases, and tubercle bacilli far more often disappear from the sputum.

I may now approach the consideration of the cases which I have myself treated with tuberculin. I have used T.R. chiefly, but I have also used old tuberculin, alone or alternately with T.R. It is impossible to give an impression of the results of treatment by mere groups and tables. Personal experience has a value of its own that cannot be disregarded, and my personal experience in a large number of cases tells me that tuberculin, properly used, has a very high value in the treatment of pulmonary tuberculosis. I have carefully watched the effects week-by-week for nearly five years, and I assert that, while the degree of improvement varies, and the permanence of the improvement varies even more, gradual improvement is the almost invariable rule. I have treated nearly 70 cases, and I do not remember a single instance in which there was no improvement, provided, of course, there was no mixed infection. Such uniform improvement under the tuberculin treatment must be due to the tuberculin, for tuberculin was the only uniform remedy. By improvement, I mean that the cough grows less and

less, and ceases. The sputum diminishes in quantity, becomes (if yellow at first) opaque-white, and then clear and frothy, and finally ceases. In all cases in Stage I. the tubercle bacilli, if found before treatment began, disappeared from the sputum during treatment, and later there was no sputum. In many cases in Stage II. tubercle bacilli disappeared from the sputum for months or years or altogether. I never stopped treatment on account of hæmoptysis, and though there were many cases of severe hæmorrhage at one time or other, hæmoptysis was extremely rare after treatment. The effect of tuberculin treatment in cases of hæmoptysis is worthy of close attention, because, if tuberculin had the effect once attributed to it, of causing rapid and extensive softening, it should surely increase the tendency to hæmorrhage. My experience is that it does the very reverse, and that in a striking manner. The rapid and extensive softening, if it has been observed, has been due to mixed infection, not to tuberculin. Mixed infection may certainly cause hæmorrhage. Tuberculin treatment, then, is specially indicated in cases of hæmoptysis—checking the hæmorrhage and preventing its recurrence. Like many other observers, I have never seen any evidence in favour of the idea that tuberculin may mobilise a dangerous enemy peacefully sleeping. In no instance did tuberculous meningitis supervene. If, then, tuberculin does not favour hæmorrhage, but rather checks it; if tuberculin absolutely arrests the cough; if tuberculin does not mobilise tubercle bacilli; if tuberculin diminishes expectoration instead of increasing it, and causes tubercle bacilli to disappear from the sputum, indicating most surely that, so far from favouring disintegration, it favours a healing process; if tuberculin treatment is accompanied or followed by marked increase in weight—an increase uniformly observed in my own cases during or after treatment—beyond a doubt all the dangers that were held to be associated with tuberculin treatment vanish into mist. They were ghosts and shadows, unreal and unsubstantial, which no rational being need fear. I can vouch for improvement in all cases provided there is no mixed infection. In many cases other physicians have witnessed the effects of the treatment, and admitted the improvement. I have not yet seen a case of pure tuberculosis that did not improve greatly. I do not pay much heed to a country practitioner, who saw one of my cases more than two years after treatment. He found that the patient had a chronic abscess—no doubt tuberculous—the abscess was opened. A mixed infection occurred in the wound, and death was the ultimate result. The medical man traced the abscess to the tuberculin treatment; yet this patient, with marked phthisical habit, had lost his cough and expectoration during treatment, and the bacilli gradually disappeared with the sputum. If this patient had had more treatment with tuberculin, he might have been living still; that, at least, is my opinion.

No one has ever said that one course of treatment for a few months will absolutely and permanently arrest a disease that has been silently destroying the lung for many months, may be, even years. In some of my cases I have given seven courses. I often combine the old tuberculin with the new, and I have given as much as seven-tenths of a gramme of the old tuberculin in a single dose—seven times the dose Koch originally recommended. The patient is alive, nevertheless, and the better for the dose. It is by dint of repeated attacks with tuberculin that even in relatively advanced cases we may hope to bring about marked improvement. Let me now give in detail the results in some cases in the various stages of the disease. I merely select types to demonstrate improvement. If we have learnt anything in the last few years concerning the results of the treatment of pulmonary tuberculosis, we have learnt to give up speaking of cure, unless we have at least watched the case for several years after treatment without witnessing any recurrence of the disease. Koch has continually urged that relapses occur often, and that relapses can be treated as the original attack

with tuberculin, alike with satisfactory results. Even cases in the first stage may require more than one course. Let me give one striking example. Mr. E., about 47, gave an ominous family history. Four brothers, one after the other, had succumbed to the disease. They had been under various physicians for treatment. They had been sent to the country, and treated in the usual way; but it was of no avail. The last survivor, having seen the failure of ordinary methods, came to me, when the fatal disease showed itself in him as in his brothers, by cough and expectoration, and general loss of health and weight. I examined him, and found physical signs of an early stage. There was expectoration, but, although I examined many times in different ways, I did not find a single bacillus. I therefore advised a test injection of old tuberculin. ·001 gr. raised temperature to 103°. All doubt was at an end. He went under a course of tuberculin (T.R.) up to 20 mgrms. The patient proved to be very sensitive, and the course occupied five or six months. During the course the patient had severe attacks of gastritis and enteritis, with diarrhœa. At one time his weight feel considerably, but ultimately the result was satisfactory. The cough hardly troubled him, the expectoration ceased, and he felt greatly improved. The improvement continued for a few months, and then the old symptoms began to reassert themselves. I gave him a second course. The second course he took very well; in two months one was able to give him the full dose. Again the improvement was very marked. Some months afterwards I saw him, and he seemed in perfect health. His weight increased from 11 st. 7 lbs. to 12 st. 5¼ lbs. He told me that in the same time from the beginning of their illness his brothers had succumbed to the disease. The treatment was carried out while the patient continued at his business, though he lived out of town. The second course hardly even upset him. Surely some change had been worked in his system that he bore the second course so easily.

To summarise an experience extending over a period of five years. Twelve case in Stage I. permanently improved; one after two courses. Twenty-three cases in Stage II. all temporarily improved; one had relapse—developed tuberculous abscess about hip, which was opened. Naturally, mixed infection might be expected, and death nearly two years after treatment. Another, aet. 57, always delicate and poor eater, was extremely cachectic, pulse 124-130, vomiting diarrhœa, and some discoloration of skin, symptoms improving with tabloids of suprarenal, perhaps tuberculous disease of adrenals, had two courses, improved under both; but several months after second course developed coma, and died. She never had fever, temperature generally normal or subnormal. A third case had a relapse with mixed infection. Could not afford to come to Sydney from Wollongong for treatment. He developed influenza, bacilli isolated, but recovered. Later developed another mixed infection, and died in 1901, four years after treatment. Fourteen others are in relatively good health, can do ordinary work—3 have had two courses, 1 has had six courses, and 1 seven courses, in various combinations. In all, *3 deaths out of 22.* In those in first and second stage, 3 deaths out of 35 (8·6 per cent.); in third stage, 9 deaths out of 16. In all, 12 deaths out of 50. Twelve cases were partially treated, but in 9 obstinate mixed infection interfered, and 3 were not able to remain in Sydney. All these cases were in third stage, and treatment did neither harm nor good.

Though Koch has not put it in our power to work miracles, he has discovered a method of treating pulmonary tuberculosis in the early stages with eminent success. His method alone rests on a scientific basis. The last word has not been said on any method of treatment, least of all upon the tuberculin treatment. Phillip, of Edinburgh, speaks in high praise of it. Is it the truth to say, then, that the treatment has been abandoned? It is difficult beyond ordinary comprehension to give a right value to the effect of any

method of treatment in a disease that runs such a variable course as pulmonary tuberculosis. It is constantly asserted that pulmonary tuberculosis is curable. Certain it is that we fail more often than we succeed in curing it. It is a most misleading doctrine for patients and physicians alike that pulmonary tuberculosis is curable in all its stages. No doubt, in many cases pulmonary tuberculosis is cured by Nature's own mysterious ways, but man has still to learn how best to imitate and help Nature. Healed tuberculosis is a common *post mortem* condition, but in most of these cases there has been no history or evidence of tuberculous disease of the lungs—tubercle bacilli are often missed in the lesions. Even if proved to be present, they may be dead, and perhaps were never alive in the tissue. Conditions of cicatrization without caseation do not necessarily depend on tuberculosis. Irritants, especially of dust particles, broncho-pneumonia, and, moreover, as Birch-Hirschfeld and others have proved, the arrested development of terminal bronchioles may lead to the production of dense fibrous areas, quite independent of tuberculous changes. We are deceiving ourselves if we measure the curability of tuberculosis of the lungs by these interesting anatomical curiosities of the mortuary. The practical physician wishes rather to know how often tuberculosis of the lungs that is recognised by signs and symptoms during life is and may be cured by man's various resources. At the very threshold we are met with the difficulty of obtaining *a priori* the usual or standard course the disease runs. Measles, scarlet fever, diphtheria, typhoid fever, and the like run a fairly typical course, and come to an end in a few weeks. We may therefore roughly measure the effect of treatment, notably in diphtheria. Yet, even some distinguished authorities still refuse to believe that antitoxin treatment is the ideal treatment. How, then, can we expect unanimity regarding the effects of various methods of treatment in a disease like tuberculosis of the lungs, that presents infinite variety, and lasts, not a few weeks, but months and years, and even a lifetime. Some tell us that the primary lesion is in the bronchial glands; some say in the lymphatics; some say in the bronchial mucous membrane (Virchow, Birch-Hirschfeld); some even that the tubercle bacilli enter the lungs by the vessels (Aufrecht). Some believe that the infective agent reaches the lungs by the alimentary tract (tonsils), whence, *viâ* the lymphatics, the apex of the lungs is invaded. The majority hold that infection occurs by the inhalation of tubercle bacilli, that may be arrested in the bronchial mucous membrane, or may pass through the uninjured mucous membrane into the bronchial glands. Wandering through this maze of discrepant opinions, we may realise the intricacy and subtlety of the great problem that is crying out for a speedy solution in the name of suffering humanity. The disease may exist for months and years without arresting the attention of patient or physician. It may become quiescent at any time, it may relapse after months or years, it may reach a serious stage involving the greater part of a lobe, and then end in perfect restoration of health. In spite of treatment of any and every kind, the disease may never relent; the victim knows no respite till death. Without any treatment, the disease may come to a standstill, and never again disturb the health. The most affectionate regard for logic may not restrain us from attributing success to our own small efforts and failures to the vagaries of the disease. Our memories seize fast hold of successes; we leave others to record our failures, or leave them unrecorded. Let us adopt what measures we may, more or less failure is the rule, and yet we place a high value on many of our methods. In no other disease is it so difficult to estimate fairly the effect of treatment upon the course of the disease as it is in pulmonary tuberculosis. One sees cases of pulmonary tuberculosis even complicated with tuberculous ulceration of the larynx or epiglottis, get well of themselves without any special treatment, without sanatorium treatment, without injections of any sort, without local appli-

cations. The best results of sanatorium treatment do not present such a satisfactory picture of success that we should rest satisfied. Analyse the statistics of Weicker's Sanatorium, or Englemann's more extensive analysis of the results in German sanatoria. We shall have to travel far before we can be satisfied. To paraphrase Lord Rosebery's epigram, the physician who is satisfied with sanatorium treatment is lost. The rational method of Brehmer was sound as far as it went, though often laborious and tedious in practice, but no other method was possible in his day. Sanatorium treatment holds out much hope of success, especially in the early stages of the disease; but surely, any method that fails in at least 50 per cent. of the cases does not satisfy the conditions of an ideal method. The plague, dreadful as it is, is more merciful—it kills quickly, but it hardly kills 50 per cent. of its victims. The results of sanatorium treatment disclosed in Weicker's careful table show that there is plenty of room for improvement. Of 881 cases, 209 had no sputum. Of remaining 672, only 243 had tubercle bacilli in sputum. That is to say, 72 per cent. had no tubercle bacilli in discharges from lung, 72 per cent. were cases of closed tuberculosis. If no tubercle bacilli were found, tuberculin was used as a diagnostic agent as a matter of routine. Thus, early cases were selected. These analyses show—

1900. Results—

Cured	0		
Improved	740	=	84·0 per cent.
Unimproved	110	=	12·5 ,,
Worse	27	=	3·1 ,,
Dead	4	=	0·4 ,,
Able to work	645	=	72·9 ,,
Partially able to work	82	=	9·3 ,,
Not able to work	154	=	17·4 ,,

1899.

Able to work	523 =	63·0 per cent.,	comp. with	72·9 per cent.
Partially able to work	42 =	5·1 ,,	,,	9·3 ,,
Not able to work	181 =	21·8 ,,	,,	17·4 ,,
Dead	84 =	10·1 ,,	,,	0·4 ,,

1898.

Able to work	268 =	45·6 per cent.
Dead	194 =	33·0 ,,

1897.

Able to work	167 =	41·6 per cent.
Dead	170 =	42·3 ,,

1896.

Able to work	43 =	24·2 per cent.
Dead	111 =	63·3 ,,

Of cases treated in his sanatorium—carefully selected cases—the mortality had risen from ·4 per cent. to 63 per cent. in the four years from 1896 to 1900. In the course of four years over 60 per cent. are dead; in the course of three years, 43 per cent.; in the course of two years, 33 per cent. Sanatorium treatment at its best falls far short of the ideal. May not tuberculin be the means of greatly increasing the value of sanatoria by establishing permanent arrest of the disease? But sanatorium treatment, whatever its

success in selected cases may be, is an absolute impossibility in the vast majority of cases. It is a utopian idea, that we can deal with pulmonary tuberculosis by means of sanatoria. Pulmonary tuberculosis is essentially the poor man's disease, and sanatorium treatment can hardly be brought to bear upon the very fringe of the disease. The system cannot be applied when and where it is most needed. To the well-to-do it offers fair prospects, and even splendid results, if tuberculin is recognised as an indispensable weapon in arresting tuberculosis of the lungs in an early stage. To the poor and needy, it is not only so costly, but it entails such sacrifices that those who enjoy the relatively good health that is not uncommon in the early stages of the disease will hardly be persuaded to seek the sanatorium. Sanatorium treatment, therefore, is no ideal plan for the majority. Further, in treating other infectious diseases—smallpox, plague, even leprosy—we do not lose sight of measures of prophylaxis. In treating pulmonary tuberculosis, prophylaxis hardly appeals to us; yet, it is more important in tuberculosis than in leprosy. From a hygienic standpoint, we cannot be satisfied with any method of treatment that ignores the purpose of prevention. Can we say too often that the best treatment of pulmonary tuberculosis is its prevention? Now, all the results of sanatorium treatment show that, as a measure of prophylaxis, sanatorium treatment largely fails. It is stated that sanatorium treatment does not cause tubercle bacilli to disappear from the sputum in more than 20 per cent. of the cases. Eighty per cent. of such cases leave the sanatoria as foci of infection. The best training and the best regulations cannot remove the danger, though they minimise it. Such persons are all the more dangerous if they expel tubercle bacilli from their lungs when they think themselves cured. No doubt, on an ideal plan, those who leave sanatoria, as those who enter, should not discharge infectious sputum; but as matters are, many enter and leave sanatoria with tubercle bacilli in their sputum, especially in the case of the sanatoria for the better classes. In this respect, then, sanatoria are not of the same public service as hospitals for consumption. On the other hand, evidence shows that tuberculin treatment has this great advantage, that in a far greater number of cases tubercle bacilli disappear from the sputum. Of cases treated by Turban with tuberculin only, 1 out of 20 had tubercle bacilli in sputum at end of treatment. Of similar cases treated in other ways, 7 out of 21 had tubercle bacilli at end of treatment. Accordingly, as a measure of prophylaxis tuberculin should be used systematically in sanatoria. Tuberculin treatment can be carried on without loss of employment. For the poor, therefore, who have to earn their daily bread, the treatment may well be recommended. The majority of my cases have suited themselves, and many of them have hardly lost a day's work. Although the treatment has involved many thousands of injections, there has never been even a small accident—not even a small skin abscess. This is surely the best testimony of the care with which the preparations are made and dispatched.

Time will not allow me to do more than mention the latest development in the matter of specific treatment. Koch has at length devised a means of estimating the effect of tuberculin treatment. The object of treatment is to immunise the tissues against the tubercle bacilli and its toxins. In most other diseases immunity is brought about by the formation of certain specific protective substances, that reach the blood and lead to phenomena of agglutination. The agglutination phenomenon is in some degree a measure of the degree of acquired immunity. In tuberculosis, such agglutination generally fails to develop, and accordingly the disease does not naturally produce its own proper remedy. But in animals, by various methods, immunising substances can be artificially elaborated, so that the agglutinating power may be raised from 1 · 10 to 1 · 1500 in goats, and 1 · 3500 in donkeys. Similarly, Koch has found that by the use of various forms of tuberculin

in human beings, the agglutinative substances can be increased, so that the power of agglutination is raised from 1·10 to 1·15, 1·100, even 1·175, 1·200, 1·250, even 1·300. Agglutination, valueless as an aid in diagnosis, is likely to be very valuable as a gauge of success in tuberculin treatment.

Thus, there is absolute scientific proof the tuberculin of various forms, used in various ways—by sub-cutaneous and even intravenous injection—does lead to the production of protective or immunising substances in the blood.

To quote Koch's own words: "That, in phthisical persons, the appearance of the power of agglutination is bound up with the formation of protective substances, we think may be deduced from the fact that the state of health visibly improves from the moment that the serum has acquired agglutinating properties. The appetite returns, and correspondingly, the weight increases, often to a considerable degree. Night-sweats cease, râles greatly diminish, and also the amount of sputum. In many patients the sputum ceases altogether, and therewith, of course, tubercle bacilli disappear. The most striking phenomena in this regard was the state of the temperature. In such patients who had no high temperature we have never seen, after the reaction had passed away, any rise of temperature that could have been regarded as the result of these reactions. On the contrary, we have regularly observed that in phthisical patients with fever, small and medium rises of temperature have been favourably influenced by the reactions. At first, a fall of temperature, only transient, occurred on the third or fourth day after reaction, at the very time when the process of immunisation sets in. The temperature then remains low for several days, but again gradually rises. If, again, a powerful reaction is produced, the temperature again falls, and is more persistent than after the previous reaction. By repeated reactions, such rises of temperature can be permanently arrested. In individual cases we have succeeded even in causing high fever with a pronounced hectic type to disappear. Therefore, the condition of fever is now no longer a contra-indication, as was the case in the use of the old tuberculin. We have only excluded from treatment such cases as are in too weak a state, and those in whom the destruction of lung is so extensive, that improvement is out of the question."

All these results were shown in cases of phthisis in the second and third stages.

The time will come when it will be generally admitted that Koch has not only taught us all we know of the etiology of pulmonary and other forms of tuberculosis, but has found also a remedy which, in skilled hands, will prove an inestimable boon to the large section of humanity afflicted with pulmonary tuberculosis.

Discussion.

Dr. A. H. Gault had some experience of tuberculin. Twelve patients had been treated (7 with the old, 5 with new tuberculin); a special selection of cases had been made. Sanatorium patients of at least six months' standing had been chosen, who were at the time in a stationary condition, with limited disease of the lung, and a temperature under 99°; but no effort was made to exclude mixed infection by bacteriological methods. Though the treatment was continued from three to twelve months, with negative results in all the cases, possibly, in two treated by the old tuberculin the end was hastened.

If patients were selected under the conditions laid down by Dr. Wilkinson, he felt sure sanatorium treatment would give results quite equal to those brought forward under the tuberculin treatment. He did not think that there was any evidence available to encourage any belief in the efficacy of tuberculin.

Dr. Verco had not been sufficiently impressed with the literature of tuberculin to induce him to use it, and so had no personal knowledge of it. He had noticed that medical practitioners who had been injecting the new tuberculin, had now substituted for it solutions of the cocodylates. This indicated a dissatisfaction with the results from tuberculin. He was more favourably inclined towards the open-air and general treatment of the complaint.

The President said that, in Melbourne, its use had been practically abandoned.

Dr. Sydney Jones asked—"Was it wise to adopt a plan of treatment which was attended with possible risks, and use it in the place of a treatment which produced no ill-results at all"? Men of the highest standing had separated against the tuberculin treatment. In England, and in Europe generally, all that was ascertained was, that in some cases tuberculin had been used with success.

Dr. Wilkinson said that Dr. Heron, of London, recently spoke of tuberculin as a boon to humanity.

Dr. Wills said that Dr. Wilkinson's figures were not calculated to impress one with the value of tuberculin.

Dr. Wilkinson replied, and cited statistics in support of the effective use of tuberculin. The matter was one that required a great amount of investigation, and the time at his disposal in the Section did not afford him an opportunity to deal with it exhaustively.

A PLEA FOR THE SANATORIUM TREATMENT OF CONSUMPTION.

BY

A. H. GAULT, M.D., Adelaide.

So much has already been said on the sanatorium treatment of consumption, that I feel I must almost apologise for taking up the valuable time of this Congress with such a hackneyed topic. My reason for bringing it before you is that, though this treatment is accepted theoretically as the best, yet, so far as Australia is concerned, it has certainly not yet received the practical endorsement of the medical profession. It is estimated that there are at least 10,000 persons at the present time in Australia suffering from pulmonary tuberculosis in an active form; and we have sanatorium accommodation for only 150 of the poorer classes. The only provision throughout the whole Continent for paying patients is one small home, with seven beds.

Australia, generally, leads in the matter of reform, and this state of affairs shows a half-hearted belief in the advantages of sanatoria. We have heard a great deal about the insular prejudices of the Old Country to such public forms of treatment, but England is now copying the good example of Germany, and it will be Australia's turn next to follow her lead. Before indicating our reasons for urging this matter, we would like to state the kind of patients for whom this treatment is demanded.

Some writers seem to think it is only for incipient cases, which we might define as those with hœmoptysis, but no physical signs, or those "closed" cases to which we often hesitate to apply the dread word consumption. Such cases under our old methods of treatment frequently recovered, and with complete change and rest, and the adoption of open-air principles in private homes, the great majority should recover. I think it unnecessary to send such to a sanatorium, for they will get better without, and so long as we cannot definitely prove the nature of their disease, I think these patients may reasonably object to being associated with pronounced consumptives. But it is my opinion that all cases with definite physical signs, the less advanced the disease the better, should be sent to a sanatorium for treatment. It is possible that the value of the open-air method has been over-estimated, but there can be no question as to its great superiority over any previously tried. The majority of such cases have, until recently, been considered incurable, for it was only occasionally that we were rewarded with a recovery, and it was hard to know to what to attribute the cure. Most patients who got better, did so by following, in the main, the principles of the open-air method; but some recovered while under the most unpropitious circumstances, attributing their restoration to health to creosote, or some other antiseptic inhalation. Be this as it may, most of our patients, after many ups and downs, died in the course of a few years—the death-rate must have been at least 90 per cent.

Of the cases brought under sanatorium treatment with only one lobe of one lung affected, I think we may safely say one-half are cured; but even this would mean the saving of over a thousand lives annually in Australia alone—lives of men and women for the most part in their prime.

In view of the decreasing birth-rate, this subject has an important economic aspect; for, if our race is to preserve its predominant position, these are the lives that must be saved.

There are no figures available to prove the value of the open-air treatment as carried out in private homes, but those who have tried it have met with a good deal of disappointment. I have had some opportunity of comparing it with sanatorium treatment, and though I cannot boast of statistics

like those "made in Germany," I can at any rate testify to the immense advantage of the sanatorium.

It has been asserted that the medical profession objects to sanatorium treatment, because by sending their patients to such an institution they are losing a valuable source of income; moreover, that they would rather keep their patients, and let them die, than lose them to save their lives. We do not accept this as a true statement of the case, though there may be something in it. It is true that the general practitioner has an instinctive desire to retain his patients. It is not by any means a question of fees; he will seek to retain a lodge patient, or one who does not pay him, rather than own that anyone else can do better than himself. But such a feeling has no right to interfere with a patient's welfare, and such action will, in the long run, prove most costly—"A live dog is worth more than a dead lion."

On the part of the public there is a rooted objection to all kinds of institutions, which nothing will overcome but the firm attitude of the profession, backed up by actual results. The disadvantages of leaving home will be more than counterbalanced by a speedy restoration to health. There is no doubt that this form of treatment will embrace other kinds of disease, and Dr. Dawson Williams' prophesy of the future for therapeutic institutions is not simply a dream, surely, for no disease can this be more essential than for consumption. Our plea is that the open-air treatment can only be carried out properly in a sanatorium, and we would summarise our reasons under these heads:—

1. A sanatorium affords a choice of climate and situation.
2. A sanatorium provides a building thoroughly adapted for the purpose.
3. A sanatorium supplies strict medical supervision, careful nursing, regularity, and discipline.

1. *Climate and Situation.*—As to climate, there seems great difference of opinion. Some think it of little importance, and point to good results obtained by the sea-side, or at a great elevation where there is a heavy rainfall, or very little. We are not going to enter into this discussion; there is probably a good deal of idiosyncrasy. However various the suitable climatic conditions may be, some things are absolutely essential.

(1) Plenty of sunshine. This, at any rate, can be obtained nearly everywhere on the Australian Continent.

(2) Pure air, free from both organic and inorganic impurities. This can be found a few miles away from our larger towns, taking care to avoid districts subject to dust-storms. Our interior is often vaunted as a suitable place for consumptives, but the prevalence of dust and strong winds make it quite unfit. In this matter, the advantages of an elevation are evident. The higher we go the freer is the air from impurities. In summer, the plains round Adelaide are very dusty, whereas, at the height of a thousand feet there is comparatively little dust. Dr. Walther, of Nordrach, claims that the large rainfall of that locality is beneficial in freeing the air from these impurities; we cannot claim that advantage in most parts of this Continent, so we must avoid the neighbourhood of dusty plains, and choose a somewhat elevated site.

(3) Absence of strong winds. In Australia, I believe, it is impossible to find anything like the calm windless regions of the Alps, or the well-protected sites of most of the European sanatoria. Australia is, on the whole, a windy place, and the striking climatic changes we experience, the wide, open

plains, and hills intersected by gullies, render us subject to strong winds.

In choosing our site we must avoid the strong sea-breezes of the coast, the exposed situations of hill-top or gully, and the wide, open plain.

In England it has been proved that the mortality from consumption is highest in windy districts, and certainly, nothing interferes so much with open-air treatment as the prevalence of strong winds. We must therefore take advantage of all the natural features of the country that afford protection from the prevailing winds, and add to this natural shelter by planting a belt of pine trees, which are much superior to eucalypti as a breakwind; doing all we can at the same time by the arrangement of buildings and shelters to enable the patient to remain outside however strong the wind may blow, and from whatever quarter.

I am told that the site selected at Wentworth Falls for the proposed sanatorium in New South Wales is subject to such strong winds that trees will not grow without protection. If this is so, I would condemn the site as utterly unsuitable, for it is no good to think that we can wholly remedy an exposed site by artificial means.

(4) Avoidance of extremes of temperature. The greatest variations are found in the elevated parts of the interior, where it is not unusual to have a fall of 50° to 60° in twenty-four hours—a blistering sun by day, and a freezing wind by night. The least variations are found on the coast; but for other reasons we do not consider this situation advisable, and think the best climate is one intermediate between the two.

(5) A bracing atmosphere. For most patients this is essential, improving the appetite, stimulating respiration, strengthening the circulation.

(6) A dry, well-drained subsoil, or sufficient slope to carry off all superfluous moisture. It is hardly necessary to emphasize the need there is for a thoroughly dry building site, and walks where the patients can exercise in all weathers.

(7) Excessive rainfall or the prevalence of fogs are a decided drawback, and must be avoided.

It has been tried in Victoria to have one sanatorium suitable for summer and another for winter; but this is quite unnecessary, and a great waste of money. A properly constructed building will cost at least £200 per bed, and it would be decidedly extravagant to duplicate an institution of this kind. A site must be found which will be suitable all the year round. It may be difficult to get one having all these requirements, but it is not impossible; they are to be found in any of the Australian States. The most likely site will be one some distance from the sea-coast, with an altitude of from one to three thousand feet; high enough to be bracing all the year round, and above the reach of ordinary dust storms, yet not high enough to be subject to extreme cold or fogs in winter. The land should be nearly level, or with a gentle slope to the north, shut in on the south by higher hills, which would shelter from the S.S.E., and S.W. winds, which are the prevailing winds over the southern part of the Continent. The grounds should be extensive, not less than 30 acres, laid out with fairly level walks. Higher land

in the neighbourhood will be valuable, that the benefits of gentle hill-climbing may be obtained. This is one of the charms of Nordrach. The buildings there are placed at an altitude of 1700 feet, surrounded by mountains on the north, north-east, and north-west, rising to a height of 4000 feet, up which, by easy gradients, the patients can ascend through the Black Forest, where the pine trees effectually protect them from the wind. Continuous rain and fogs would be a great drawback, though the rainfall must be a fair one if it is to furnish the only water supply. Wind and dust are the chief things to be avoided. A pleasant landscape, an extensive view of hill and plain, the shade of trees, a well-stocked garden, will all prove of value in the treatment of consumptives.

You will agree, that a sanatorium erected with due regard to these considerations, will possess advantages most difficult to find in a private home.

2. The next thing to consider is the building. In a private house it is almost impossible to find a room suitable for a consumptive. Modern homes are built for the sake of appearances and convenience. The question of fresh air is a secondary consideration. Temporary accommodation for our patients in tents and wooden shelters may do well enough in climates where the variation in temperature is slight; but in most parts of Australia there is a difference of 70° between summer heat and winter cold, and the change is often extremely rapid; under such circumstances, nothing will suffice but a good stone building. Superaëration is the prime factor in sanatorium treatment; everything must give way to that. The patient must breathe pure fresh air twenty-four hours of every day. Private homes may exist in which it is possible to have rooms properly ventilated in all weathers; but I have never yet seen them. How often do we hear the lady of the house boast of her love for open windows and good ventilation, while all the time our nasal organs plainly tell of stale air, but caution forbids us to speak. It will be a long time before the general public understand the meaning of "fresh air." No chemical analysis is necessary. Air in a room is fresh when the educated sense can detect no difference when entering it from the outside. In the construction of a sanatorium this is the first consideration; every room must be pervaded with fresh air by day and night, in summer and winter, when a strong wind is blowing or no wind at all. To do this and at the same time avoid extremes of heat and cold, admit sunlight freely, yet exclude flies and mosquitoes, is a task worthy of the best architect.

It can best be done by erecting a substantial stone building, on the Nordrach plan—a single row of rooms, with a passage behind. The front of the building should face north, and be sheltered by a verandah, not too wide, having glass over the windows of the rooms to admit sunlight in winter. All windows must be of the casement pattern, much larger than ordinary ones, and having a large fanlight over them, as well as over each door. At Nordrach the windows and doors take up about one-quarter of the wall-space; something less than this will do, but at least half of one wall should be window-space. For ordinary weather there will be a good draught right through the room, but when it is very stormy one side can be shut. It is generally assumed that breathing cold air does no harm so long as the body is protected; but this is certainly not true where the larnyx is diseased, or the patient cannot breathe through the nose. At Dalby, the patients sleep outside nearly all the year round. This is also done in London in the open-air galleries of the Hampstead Hospital; but I feel confident that this would be injurious in Southern Australia, on account of the strong winds. Moreover, I think that delicate patients will require some artificial heating apparatus in their rooms; hot-water coils are in every room in the

Continental and English sanatoria, and are much better than open fireplaces, and I should recommend their use during the winter here.

Just as in surgical practice antisepsis has given way to asepsis, so, in a sanatorium it is not a question of disinfection, but the most scrupulous cleanliness. The walls must be non-absorbent, the floors polished, the woodwork free from ledges, the furniture such that it will not allow dust to collect. There is no need, however, to go in for the Spartan simplicity sometimes insisted on. Washable curtains, mats, and leathern-covered chairs are permissible.

(3.) We come to the third point, the most important of all. In a private house you may get all you require in the way of climate and situation, you may have rooms sufficiently ventilated; but it is only in a sanatorium that you can get strict medical supervision, careful nursing and feeding, combined with the regularity and discipline of an institution. To the casual observer the elaborate details may seem superfluous, but in reality they are of the utmost importance. The patient's life hangs in a balance; nothing is too trivial, the slightest thing may turn the scale; but he is under constant observation, and any deviation from the normal is noted and remedied.

Let us note the *general advantages* of treatment in an institution. In the first place the patient experiences a complete change; the cares and excitements of home-life are put on one side, and he is able to devote all his attention to the one purpose of getting better. Recreations and amusements are of a mild and unexciting character; communication with the outside world is restricted as much as possible. For the time being the patient has to live as a mere machine; he has not to consider whether he will do this or that; his life is regulated by a clock-like precision; his day is planned out for the best advantage to his health; nothing else is considered. Only those who have seen the wholesome effect of such a routine can realise how much the mind influences the body, and to how great an extent the nervous temperament of the consumptive interferes with his physical well-being. It might be thought prejudicial to bring together so many suffering from the same complaint, but it is just the reverse; each congratulates himself that he is better than some one else, and however monotonous the life may seem, we must remember all are buoyed up by a certain hope of recovery, and are intent on achieving it. This does not make them introspective, for instead of wondering whether they feel better or worse, they look at their temperature and weight-chart, and note the improvement; they remember how they were kept in bed the first week; then were allowed to lie on the verandah; then to take short walks, gradually becoming longer and more arduous; formerly they had night-sweats, now they have disappeared; the cough is better, appetite improved, and they are well pleased to endure the restrictions of a public institution for the sake of the great advantage. Steady progress is the best medicine. When once the habits are formed, it is comparatively easy to keep them up.

The three cardinal principles of the open-air treatment are "fresh air," "good food," and "rest." How simple it seems, and yet how hard to secure in private practice.

Let us take them one by one. *Fresh air* as much as possible. But our private patient is his own judge; we cannot watch him day and night. He may lie on the verandah all day, and then go and sit in the common sitting-room for an hour, or shut his one bedroom window once in a way because it was so windy, and the progress of a week is undone. When a patient first goes to a sanatorium, he stares aghast at the open windows, and bemoans the number of colds he is going to catch; but others keep their windows open; he follows their example, and soon falls into the ways of the place, and before long learns to revel in that blessing unknown to so many, fresh air.

Draughts and "colds" are the great bug-bears of the consumptive; he soon learns to disregard the one, and lose his acquaintance with the other. Instead of wrapping himself up with chest-protectors and overcoats, he is taught to wear as little clothing as possible, so long as he does not feel cold, and he is quite surprised how much exposure he can stand, for his nervous and cutaneous systems have become healthy, and his natural resistance enormously increased. He does not "dress" for dinner, but is taught that people need to be clad just as properly, and need as much clothing indoors as out of doors.

Good Food.—One of the requirements of a sanatorium is a good cook. No special diet is required; but it must be liberal and nutritious, and include plenty of meat, milk, and butter. The forced feeding that we hear is practised at Nordrach and elsewhere is quite unnecessary and useless. A little encouragement is helpful, and the presence of the Medical Superintendent at the dinner-table is a great advantage. The patients become proud of their appetites; a friendly rivalry exists, for if there is one thing they are anxious about it is to gain weight. Gain of weight is not everything; a patient may be gaining, and yet getting worse. Nevertheless, it is a valuable sign, and the consistent way in which sanatorium patients gain has no equal in private practice. This must be due to the strict regularity of diet; the hour's rest before meals, and the general sense of self-satisfaction and well-being. At Nordrach there are only three substantial meals a day; this will suit some, but those who cannot eat well will require something between these meals.

Rest is so important that we are apt to forget the value of exercise; but it is the due proportioning of these that is one of the main features of the Nordrach treatment. Rest is necessary for active disease, high temperature, and losing weight; but to restore health, strengthen the circulation, develop the healthy part of the lungs, exercise is required. The patient is utterly incapable of gauging his own powers, the Medical Superintendent must be the judge; and it is important that he should see him on returning from his walk, that he may estimate the effect of exercise on his circulation. The temperature, also, is a good guide, and I fully approve of the Nordrach plan of taking it. The patients take their own four times a day, and the rectal temperature is to be preferred, as it is more accurate and sensitive. Some think it unwise for the patient to know his own temperature, but we find it does no harm, and as it almost invariably goes down under the treatment, it is a source of encouragement, and teaches him how the slightest indiscretion influences his temperature and retards his recovery; it also helps to fill in the day for the patient, and saves the nurse's time. The distance must be apportioned for each day, and the results noted; as improvement is made the walks become longer, but there must be no hurry or excitement.

There are many adjuncts to the sanatorium treatment, such as hydro-therapeutics and massage, which can be carried out much more effectively with trained attendants, and in an institution; and though not laying much stress on these they may prove valuable in some cases.

I think I have said enough to prove the vast superiority of the sanatorium over the private open-air treatment of consumption; but it must be admitted a great deal depends on the Medical Superintendent. A young, inexperienced man, with a small salary, who only intends to hold the position for a short time, is not likely to make it a success. A man must have a special training, and be willing to devote his whole time and energy to the work. The best results have only been obtained by men like Brehmer, Dettweiler, and Walther, who have devoted their lives to perfecting the treatment. Success largely depends on discipline. I suppose nowhere are the restrictions more rigid than at Nordrach; but I have never seen a happier, jollier set of men and women than those I met in Dr. Walther's establishment.

In the past, consumption has been a cause of disappointment to the consultant and to the general practitioner—a source of income, but not of kudos—and the public have accepted the results with resignation. But now, all is changed; they are told consumption is curable, and they expect it to be cured. I believe there is a great future for such institutions in Australia, but it will be a long time before they hold the same estimation in the public opinion that they do in Germany, for, after all, it must be admitted that some of the success is due to the glory that surrounds the name. But when we find a man with the same enthusiastic devotion to his work, and patients with the same unbounded confidence in their chief, results equal to Nordrach will be tabulated in Australia. The matter is in your hands, gentlemen. Sanatoria will be established as soon as the medical profession is willing to admit that consumptives cannot be treated satisfactorily in private homes.

ENLARGED BRONCHIAL GLANDS IN CHILDREN.

BY

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The subject on which I would crave your attention might not be at all new to most of my hearers, since it is a condition which has long since been recognised pathologically, and which one finds fairly frequently at autopsy. Nor is it then of primary importance,usually being as it were but part of a commonly observed pathological picture, one of the results of an antecedent infective process. But, of all the pictorial details which are commonly found in this particular process, it is perhaps the only one which is fairly easily recognisable before death, and which can justly be regarded as the indirect causative factor of many of the leading features in the symptom-complex. Robbed of these guiding marks, the condition would often escape elucidation, at least the piecing together of the puzzle would be attended with no little difficulty, since the other features of the sketch are clinically, but dimly visible before death.

The signs which enlarged bronchial glands give rise to stand out as landmarks, which, if due regard be paid to them, and their proper significance noted, enable us to recognise a general pathological state with almost a certainty; otherwise, this condition might readily escape notice, and in diagnostic medicine, to be forewarned is to be as truly forearmed as ever it was. It was particularly in some investigations on coughs and their causes that I made my acquaintance with the condition of bronchial hyperplasia. During the last few years in practice at the Children's Hospital, a great many cases presenting the symptom of cough have been met with, and it was whilst carefully trying to find out the different causes of this trouble that most of the cases were found, though I had five years ago been led to suspect that the presence of large tracheo-bronchial lymphatic glands would give rise to certain definite signs indicating their presence.

The case was an interesting one. I will not detail its history, except that the child suffered from spasmodic cough, headache, languor, began to lose his appetite, and to sleep very restlessly, calling out sometimes, had lost a good deal of flesh, was markedly anæmic, hot and thirsty at nights, and had also night-sweats, pulse usually more rapid in the evening, and the voice had undergone some changes, being brassy and high-pitched. On admission his temperature was 99, pulse 156, respiration 72. No dulness in lungs, except a little to right of spinal column in interscapular space. Few moist sounds in larger bronchi on right side, but none on the left. The child seemed to be going on fairly well for 11 days, when he had a slight hæmoptysis, from which he recovered, only to die the next day from a fairly large hæmorrhage which flooded his lungs. The *post mortem* examination disclosed a bronchial gland which was caseating, and which had, by ulceration, made its way into the bronchus, and also into the pulmonary vein. Scattered over the lungs were small caseating areas, tubercle over liver and in a subscapular situation in the spleen. The *post-mortem* appearances were a logical cause for the symptoms during life, the spasmodic nature of the cough, the anæmia and wasting, and the attacks of dyspnœa and the night-sweats. The patient really was affected with what some writers used, in my student days, to refer to as bronchial consumption.

At first sight it seemed strange that the patient should have recovered from the first attack of bleeding. However, if we assume that the bleeding was

caused by the ulceration through the bronchial artery, it explains the clinical history. There must have been a free communication with the bronchus for some time, however, if we hold the successive attacks of dyspnœa to be caused by the aspiration of caseous material into the tubes composing the bronchial tree.

This case, unique as it is, however, is not without a good few parallels, as similar cases have been recorded by Drs. Gee, P. Kidd, and Gulliver, also by Drs. R. W. Parker and Coupland. Longbotham records a similar case (*Lancet*, March 19th, '98), where a bronchial gland ulcerated into a bronchus bodily, causing obstruction to the breathing—so much so, that artificial respiration had to be resorted to. The child recovered, and a microscopic section proved the nature of the condition. Cases exactly like the above have been recorded by Voelcker and Ogle.

I was very much interested in my *post mortem* examination, and the thought occurred to me—"How many similar cases had I ineffectually treated"? I at once decided to try and find out some cases of a milder type, and to observe their clinical symptoms, and, as a starting point, a number of autopsies were closely observed as to the pathological state of their bronchial and broncho-tracheal glands, and the lungs.

First, as to the glands, which are anatomically situated around the large bronchial tubes, and extend for a short distance into the lung tissue itself. Some of the glands were simply enlarged and hyperæmic, like inflamed glands elsewhere, whilst others were very large and pinkish-red, with numbers of bleeding points on section; others, again, were enlarged but greyish-white on section, with commencing caseation; whilst yet others showed advanced caseous degeneration into a puriform-like fluid. In most of them the capsule of the glands was thick and adherent, showing a chronic inflammatory process; whilst in two cases there were miliary tubercles deposited on their surface, as part of a general process. In some cases the glands were more or less separate, in other cases the separate glands were indiscernible microscopically, the glands and inflammatory tissue being matted firmly together. In some of the more extreme cases, the left recurrent nerve was involved in the mass, whilst other branches and the main vagus trunk were often found to be implicated more or less. The shape of the bronchial tube was altered in nearly all cases, the chief change being a flattening. The lower end of the trachea was seldom found altered to any extent in shape. The lungs of these cases presented a variety of appearances, some being little, if at all, affected, though the pathological changes in the glands were advanced even to caseation—so little change, that it would be difficult to detect physical signs during life; others showed a broncho-pneumonia of the tubercular variety. Two or three cases presented marked vacuolation of the lung-substance, numbers of little cavities being interspersed through the pulmonary tissue. In others, again, areas of caseation and small cheesy patches were very prominent features. It must be stated that, whilst these pathological researches were being carried out, an epidemic of measles was raging in Melbourne, and perhaps some of the *post mortem* signs in the lung itself were due to a measles broncho-pneumonia. No microscopical examinations of the lung tissue, unfortunately, were carried out.

It is really surprising to find that the lungs escape serious involvement so often, situated as they are in such close proximity to such advanced foci of disease as these tubercular broncho-tracheal glands, and yet in a large number of autopsies on cases dying of tubercular meningitis (52 in three and a half years), such was the case, the lungs being found free from obvious disease in a large number of these specimens examined.

Reviewing these *post mortem* signs, one was able to build up a hypothetical clinical picture. The pressure on the left recurrent laryngeal nerve

would probably account for the jerky cough, hoarseness, and high pitch of the voice. Pressure on one or other bronchus would probably account for the slightly diminished entry of air into one or other lung. The general symptoms, such as lassitude, anæmia, and general wasting of the body, are probably toxic effects, in some few cases no doubt largely due to pulmonary infection. Three cases I have noticed in whom there were well-marked attacks of fainting. This untoward symptom might have been caused by some involvement of the vagus trunk, but of this I would not feel certain, since, though the vagus trunk was often found involved at autopsy, the three cases were the only ones I could collect with this symptom present.

I have now collected 48 cases of this condition. The first case that was diagnosed unfortunately died, but I had the opportunity of verifying the diagnosis at the *post mortem*. This case had extensive disease in the lungs of a tubercular nature, but was far advanced when I first saw her, so could not tell whether the lungs or bronchial glands were first affected. All the cases I have collected are not tubercular cases, many of them being influenzal in origin; they have been noted merely to show that the detection of their enlargement is possible; and if these lesser degrees of enlargement can be diagnosed, then surely there should be little difficulty about the detection of the greater degrees of enlargement, *i.e.*, tubercular cases. I am sure that amongst children many cases are walking about with this focus of infection present, which I consider must, with the mesenteric glands, be one of the first affected, for, in every case that is proved to be tubercular at *post mortem*, the bronchial glands or the mesenteric glands will probably be found to present the most advanced appearances, so that, probably, either of these sites is the earliest point of infection.

Now, I hold it to be a manifest advantage to be able to detect—by physical signs alone—the earlier stages of tuberculosis in the child, since prognosis and treatment rest on the diagnosis. And the treatment of this condition is no hopeless task, when we take into consideration the fact that they are sometimes, not rarely, found in a condition either of quite dry caseation with thickened capsules, or else of calcification, in which state they are virtually innocuous, and might therefore, for practical purposes, be considered almost outside the body. And, seeing that they very rarely kill of themselves, except in the few rare cases like the one described in the earlier part of this paper, we are forearmed against the possible infection of the lung substance later on, this being the usual process through which death is brought about.

Enlarged bronchial glands, therefore, contribute to a fatal issue only in an indirect way; that is, in the majority of cases. But, though not of themselves often fatal, they may give rise to some of those instances of slight ill-health in children which are so difficult to diagnose, and while undiagnosed, respond so little to treatment, which must therefore be more or less ineffectual—mostly more. Commonly enough, a child is presented for treatment with slight feverish attacks, liability to colds, short hacking cough (occurring especially at night), perhaps some voice-changes, either a huskiness or a high-pitched tone being developed, the lungs apparently normal, and no sign of other infective process, and in whom there are no adenoid vegetations, the usual cause of nocturnal cough or asthma. In fact, many of the cases collected have occurred amongst children from whom the adenoids have been removed without affecting the course of these nocturnal attacks. Now, such a case should be carefully scrutinised as to the bronchial glands, and fairly frequently they will be found to be enlarged. At a later stage, when anæmia and wasting become marked, and marked physical signs manifest themselves in the lungs, no doubt the condition would be readily recognised; but at that time the process would have obtained a long start of the treatment which has to follow.

The Causes.

Tubercle.—Chief amongst the causes must be mentioned tubercle. It is a peculiarity amongst children, that very many of the cases of tubercle present the tubercular changes only or chiefly in the bronchial gland, probably, these lymph nodes being second only to the mesenteric glands. For a long time, too, tubercular changes may be limited quite to the glands, as is often seen at autopsy, though in some cases the lung becomes affected later on. The physical signs in the lungs are, I think, more often basal than apical, and basal crepitations over a limited area, and lasting for some time, are in all likelihood due to a tubercular broncho-pneumonia. In almost every such case the retro-bronchial glands will be found to be enlarged if carefully examined; when apical crepitations are detected in these children, they are usually, though not always, but part of a general pulmonary inflammation. Cavity formation is very rare, but sometimes present, and then is usually due to the caseating changes taking place in small glands which follow the bronchi into the lung for a short distance.

Influenza.—Perhaps this is one of the commonest causes of the inflammatory hyperplasia, leading, however, to a lesser degree of enlargement than the tubercular variety, and, consequently, to little dulness posteriorly.

Measles and Whooping Cough.—In both these conditions, associated as they are with a catarrh of the bronchi which may become chronic, the glandular change is likely to take place, though the enlargement does not usually last very long.

I suppose lymphadenoma and allied conditions should be mentioned amongst the causes; but of them I have had no cases, so dismiss them from notice at present.

Repeated attacks of pulmonary catarrh may be looked upon as a probable cause. In such children, the bronchial gland may be found to be enlarged, and even caseating; but perhaps this condition accounts for the repeated catarrhs.

As to symptomatology, I have been in the habit of late years of separating these cases into three clinical types or classes, and every case falls into one of these groups:—

1. Those with mere physical signs of the condition, in whom the enlargement is not great enough to cause symptoms.
2. Those with the physical signs and marked symptoms probably due to pressure on important structures.
3. Those with the signs and symptoms of Group 2, but with also symptoms due to absorptions of toxins, with symptoms of pulmonary infection, and perhaps infection of other organs.

This classification, a purely clinical one, of course, is not at all necessary, but has proved convenient for all practical purposes.

In Group 1 may be placed all cases of simple hyperplasia of bronchial glands not obviously tubercular, as well as the earlier stages of the tubercular form. It is typically represented in the enlargement to be found in children after measles, whooping cough, influenza, or chronic catarrhal conditions. It is usually only a clinical curiosity, very few symptoms being produced, and the only sign being a diminution of the vesicular murmur on the side affected, discernible all over the chest, anteriorly, posteriorly, and laterally, almost no dulness being developed in the interscapular space, and few, if any, pulmonary signs being detected, except, perhaps, the catarrhal sounds in the lung, which caused the enlargement of the glands. These signs usually clear up in a short time, except in the tubercular cases, in which the physical signs gradually increase in intensity till definite dulness in the interscapular space is found, with other signs or symptoms, such as thermal increase, cough, wasting, &c.

Group 2.—In this class come all those cases which exhibit to a greater degree the physical signs of the first group, with other symptoms due to pressure on important structures, but without any signs of definite lung or other infection, and very frequently without any rise of temperature. The symptoms in this group are mainly due to mere pressure. Prominent amongst symptoms, on account of its frequency, is a peculiar stridulent spasmodic whoop-like cough, which might readily be mistaken for whooping cough; but it is not brought on during the taking of food, or by laughing, crying, &c., as the pertussis attack is. I have a child under my care now in whom this symptom is most marked, coupled with a most marked diminution of the vesicular murmur over the right side, and a peculiar high-pitched inspiration. This cough is apt to come on in attacks, and is more particularly a night cough, the patient being fairly comfortable all day, but developing this cough at night—and these children are frequently restless sleepers. In many of these cases this night cough is present apart from any post-nasal lymphoid hypertrophy, the commonest cause of such a symptom. The loss of sleep and the continuous cough at night results in a certain amount of loss of nutrition, which thus favours further infection of the lung, or assists in paving the way for a tubercular infection of the glands themselves, or of the lung. The pressure on the pulmonary artery may cause a bruit, best heard over the first bone of the sternum, sometimes a little lower down, and especially, in certain cases, when the patient is made to retract the head strongly. Eustace Smith pointed out this sign 27 years ago, but I have not found it so constantly as that eminent authority would lead his readers to suppose. Some cases present voice-changes, a peculiar huskiness or high-pitch of the voice. In one case which I have at present under treatment, this sign has become most marked since the retro-bronchial glands have become enlarged. Another case, also under treatment at present, has a particularly high-pitched expiration, with marked physical signs of glandular enlargement, though otherwise, the patient seems to be perfectly well.

Another symptom, which I have found present in three cases, is a peculiar form of fainting attack. I have three marked cases of this description in which the patients get fainting attacks, one of them on catching a fresh cold. This latter patient is aged, now, nearly five years, and except for the enlargement of bronchial glands, is perfectly healthy, with no suspicion of heart disorder or epilepsy. May these fainting attacks be due to a sudden enlargement of the bronchial glands pressing on, or in some way interfering with, the cardiac branches of the vagus? Dr. Bradford, before the Pathological Society of London, in 1898, held similar views to my own. I have had the chance of seeing this patient frequently, and accurately observing her. Her heart is normal in every respect, and one could be fairly sure that these attacks, of which she has had five, are not due to any cardiac condition, nor to epilepsy. Another case presents attacks of fainting, and a peculiar blotchiness of the skin, with an abnormally slow pulse, down to 46, the slowest that I have seen in him. This group of cases never presents the profound wasting and anæmia that is to be almost constantly found in cases of the third group.

Group 3.—In this group the symptoms of pressure are coupled with symptoms of toxæmia, as night-sweats, thermal increase, &c., showing that other organs have become affected, the lungs most frequently. The physical signs showing implication of the lungs are chiefly found at or towards the base, with, perhaps, some areas of bronchial breathing. Dulness in this region may or may not be marked according to the area and intensity of implication of the lung. The wasting becomes extreme in degree, and the general health of the patient distinctly bad. The pressure symptoms are as marked as those in the second group, but not always more so, the severity

of the symptoms—marked anæmia, obstinate cough, and wasting—being sometimes due to pulmonary infection, and not to any marked increase in the size of the glands.

As to the physical signs which I have utilised to differentiate these cases of enlarged bronchial glands, I will only call your attention to two, apart from symptoms. The chief, to my mind, is the presence of diminished vesicular murmur on the right side; the other, and less important, is the presence of interscapular dulness. This dulness is usually found about the level of the second, third, and fourth ribs posteriorly. From a fairly large number of examinations, I should say that the interscapular dulness is rather difficult of detection, though, in cases of considerable enlargement, it is quite obvious. But these are just the cases in which the help is not so necessary, since the other symptoms and signs are then almost obvious; therefore, I do not lay very much stress on slight differences in percussion note.

The lessening of the vesicular murmur on the right side is, in my opinion, much more to be depended upon as a sign of early enlargement, especially when it exists on the right side; and in the series of cases on which this paper is founded, those which exhibited the sign anteriorly, posteriorly, and laterally only are included, though in some cases there was a lessening of the vocal resonance as well. This sign is very easily recognised, and therefore, should be easily corroborated. The presence of Eustace Smith's sign above alluded to needs some comment. He laid down the statement, that it is the earliest sign of bronchial hyperplasia, but I have not found it at all constant. Anæmic murmurs heard above the lower end of the first bone of the sternum have to be differentiated, and I should say, that in all cases where the bruit is developed on retraction of the head, it should cease on flexing the head again, otherwise, it is difficult to make certain that it is due to the pushing forward of the glands against the pulmonary artery. With all respect to such an authority as Eustace Smith, I think the sign is a comparatively late one, and that the diminution of vesicular murmur would have been discovered at a date prior to that if searched for.

As to enlargement of the veins of the chest, I have not found it a prominent feature of my cases.

In the differential diagnosis there are two conditions which naturally rise in one's mind as liable to cause confusion. Pleurisy, with thickening of the membrane, and congenital peri-bronchial fibrosis in the child (also bronchial stenosis in the adult), both the latter being usually of syphilitic origin. Now, these latter conditions are extremely difficult of detection, perhaps impossible, so that the chief lesion from which to differentiate this bronchial hyperplasia from is a pleurisy of some extent. A pleurisy, however, is seldom of such a magnitude that it lessens the vesicular murmur equally all over the lung from base to apex, still, the possibility of such a pleural inflammation must be taken into account. As to the cause of the enlargement, this may be, in advanced cases, simple to diagnose; for instance, in extreme cases, with much wasting, night-sweats, and rise of temperature, the probable cause—tuberculosis—is obvious; but there are other cases with well marked interscapular dulness, and markedly lessened voice and breath sounds, in whom the enlargement may be considered to be non-tubercular. I am attending a doctor's child at the present time, who had marked dulness and lessened breath sounds over the entire right side of the chest, but without evening rise of temperature or other symptoms. His nasopharynx was cleared of a good amount of adenoid tissue, and since then the little one has improved materially in health and body-weight, and his bronchial lymph nodes have so lessened in size that they are practically normal again. In this case, whooping cough was the probable cause. I should say that any enlargement that continues for more than a month or so after the cessation of the original cause, and in spite of appropriate treatment, such as change of

air, &c., is in all likelihood tubercular in nature, and must be treated accordingly.

The treatment I would recommend is very much the same as one finds beneficial in phthisis—exercise in the open air, change of air (especially at high altitudes), forced feeding, a careful hygiene, coupled with guaiacol and cod-liver oil internally. A new remedy—Nuclein—has been tried in several cases recently; but as other measures were applied at the same time, it becomes difficult to estimate its true value. The general treatment should aim at getting these little patients into as good a state of health as possible, to give them a chance of having their bronchial glands safely encapsuled, and to prevent possible infection of the lung. In the cases where an infection of the lung has caused the bronchial enlargement, of course, appropriate measures to this end will be called for.

For the spasmodic phlegmless cough, a dose of bromides before going to bed will be found very useful. An inhalation of creasote and menthol vaporised on a hot shovel under the child's cot is exceedingly beneficial. At any time during the course of the treatment, a sudden dissemination may take place, such as a pulmonary infection, or even a generalised tuberculosis. Caseating glands may rupture into a bronchus, into a pulmonary vein—as in the case reported, *Inter. Med. Journ.*, December, '99—or into the mediastinum, causing a mediastinal abscess, or into the pleural cavity, causing an empyema.

Disease of the bronchial glands is a very common condition in children; this will be admitted by everyone who has done or seen a large number of *post mortem* examinations in children. It will also be conceded, I think, that old tuberculous bronchial encapsulated, and practically harmless glands are fairly common in adults; but between these two extremes there is a long list of possible fatalities. Consequently, as an aid to prognosis, and as a guide to therapeutics, the diagnosis, which I have attempted to show to be a fairly easy matter is important and far-reaching in its results. That a certain child has this enlargement, that it is probably tubercular, and that it may at any time develop acute tuberculosis, is, to say the least, an important discovery. It is to urge the prevalence of this pathological state, and the comparative ease of detection of it, that prompted me to claim your attention, seeing what an influence this condition may have on the health of so large a percentage of our community.

EMPYEMA.

BY

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BEFORE discussing the question of empyema, I wish to define as accurately as possible the actual disease of which I am about to speak. Empyema, as a term suggests no pathological significance, it simply means that pus is present in the pleural cavity; but that pus may be the result of a variety of pathological conditions. In the text-books the disease is treated either as a form of acute pleuritis, or as a sequel to it. Believing that this classification conveys a confusing idea as to the nature of the disease, I would prefer to treat the empyema of which I am speaking under neither heading, but to consider it a disease *per se*, or preferably, as one form of pneumococcal infection. But, as the disease is so universally considered in connection with pleurisy, I will, for the present, consider it under that heading, but will adopt a different classification to the one usually employed.

Pleurisy may be divided into two groups—

1. Simple pleurites, which may again be divided into—
   (*a*) Dry pleuritis;
   (*b*) Pleuritis with sero-fibrinous effusion.
2. Pleuritis, with purulent effusions, subdivided as—
   (*a*) Primary;
   (*b*) Secondary.

In the primary variety, I would place that form of purulent effusion resulting solely from the action of the pneumococcus bacteria; in the secondary, those cases set up by other bacteria, as the streptococcus, staphyolococcus, &c.

It is of the primary variety of purulent pleuritis that I am speaking to-day, and to it I would confine the term "empyema." The secondary variety may be the result of many causes: direct infection from an external wound; infection of a serous effusion by faulty aspiration; rupture of an abscess in the lung, tubercular or otherwise; rupture of a spinal abscess; rupture of an hydatid tumour; but the primary form is always the result of pneumococcal infection, just as much as are the rarer diseases "pneumococcal arthritis" or "pneumococcal meningitis." I say again that, when I use the term "empyema," I am alluding solely to this form of purulent pleuritis, and I wish to urge the plea that the term "empyema" should be restricted to this particular form of disease, because, as I shall show later, it not only differs from the other forms of purulent pleuritis in its etiology, pathology, and clinical symptoms, but also, in consequence, renders itself amenable to different treatment. In the vast majority of cases it is secondary to pneumococcal pneumonia; in all those that I have personally investigated, such has been the case, but I see no reason why it should not commence in the pleura *ab initio*.

In a paper published in the *Australian Medical Gazette* of November, 1898, I endeavoured to show that, unless infected from without by faulty aspiration, the effusion of acute pleuritis does not become purulent, and that empyema, as I use the term, has no connection with that disease. In continuation of that proposition, I will draw a brief comparison of the two diseases.

Leaving dry pleurisy out of consideration in pleurisy with effusion, the onset of the disease is generally gradual, with considerable initial pain, the

temperature is moderate, toxæmic symptoms are absent, respiration is not markedly affected until the effusion is considerable, or unless the pain is excessive; the characteristic signs are easily recognised. On aspiration, the fluid withdrawn is clear straw-coloured, with a tendency to coagulate—there is no likelihood of the needle being blocked by fibrinous masses, and the chest can generally be completely evacuated. Subsequent aspiration, if necessary, always results in similar fluid being withdrawn if ordinary aseptic precautions have been adopted. This fluid, when examined bacteriologically and microscopically, usually gives a negative result; whatever else is found, the pneumococcus is conspicuous by its absence.

In empyema, the onset is sudden, the temperature is high, the toxæmic symptoms marked, the respirations rapid. In the early stages it may be difficult to pick up any physical signs, but later, the pneumonic ones become manifest. After the lapse of five to seven days, the symptoms subside, and the temperature falls to normal. The physical signs, however, remain, and often difficulty is experienced in deciding as to whether the dullness on percussion is due to an effusion or to a consolidated lung. If a hypodermic needle be inserted, probably no fluid is withdrawn; it has passed into a mass of solid fibrin—in serous effusion, the pleuric membrane is never so thick that an ordinary hypodermic needle will not pass through it and reach the fluid. After a few days the patient is found not to be improving, and the temperature begins to rise, the physical signs remaining much as before. If aspiration is now performed, a small quantity of a thin watery fluid, almost colourless, but with a slightly greenish tinge and slightly turbid, is withdrawn. It shows no tendency to coagulate, but if the needle is big enough, a little flocculent matter may be present; the needle is frequently blocked. Microscopically, lymph-cells are found, and pneumococci may or may not be present. If aspiration has been delayed to a later stage, when the temperature has begun to become irregular, the fluid presents a more purulent character, and a pure culture of the pneumococcus is obtained. If the chest is opened at this stage, large masses of fibrinous exudation are found more or less adherent to the pleura, from which they can be stripped, leaving the surface of the pleura smooth. If the operation is further delayed, say, till five or six weeks after the onset of the disease, a fluid, identical in appearance with thin pus, is found, with only slight evidence of the presence of fibrinous masses, and with none cohering to the pleura; in these cases, often, no cocci are to be found—if the chest is thoroughly washed out and a drainage-tube inserted, it will be found that the after-discharge is not purulent at all, but serous in character, that is, for the first day or two.

We seldom have an opportunity of seeing a *post mortem* examination of a case of pleuritic effusion (unless it is due to malignant disease, which is outside the question under discussion), or of empyema; but we often do in cases of acute pneumonia of pneumococcal origin. It is no uncommon occurrence to see, in the cases that have succumbed at the height of the disease, large masses of fibrin, sometimes an inch thick, covering the base of the lung, or attached to others of its surfaces. This fibrin is of a similar character, only firmer in texture, to what we meet with in operating on an early case of empyema. I direct your attention to this, because I believe here we have the origin of empyema. As the diphtheria bacilli cause an exudation which, gradually softening, is absorbed or comes away, so the pneumococci cause an exudation which gradually softens and liquifies. When the latter occurs within the air-cells, it is either absorbed or is expectorated; when it is confined to the pleural cavity, if only small in quantity, it may be absorbed; but when it is present in the masses I have above described, it gradually liquifies, and is retained in the pleural cavity, and where, acting as a foreign substance, it causes an increased secretion from the pleura, and so fills the chest with fluid.

This theory of the pathology of empyema, to my mind, explains the clinical features of the disease. The initial pneumonia of pneumococcal infection accounts for the severity of the onset; the toxic force of the disease is expended in the usual time. In ordinary croupal pneumonia affecting the air-cells of the lung only, the products of the disease, as evidenced by the continued expectoration and the gradually resolving lung, remains for more or less time after the crisis has passed; but here, as I said before, these products are gradually being eliminated. When, however, these products are on the outside of the lung, there they remain till Nature starts its eliminating process. At first, this gives rise to no constitutional disturbance, and the patient remains in a quiescent condition; soon, however, the process becomes irritative, and gradually increasing constitutional disturbances arise, and, aided by physical causes, that is the increasing distention of the pleura—the condition becomes serious. If unrelieved by operation, death usually ensues—I say usually, because I have known of at least two cases when an operation was absolutely refused, yet recovery took place; absorbtion taking place, but a collapsed lung resulting. I may add that there was no possibility of an error of diagnosis having occurred, as I had withdrawn a hypodermic syringe full of pus in each case.

The correctness or otherwise of the theory I have expounded has a very material bearing on the question of the treatment that should be adopted in cases of empyema. I believe it means the considerable reduction of the time in which a cure should be effected. If, in place of a large pleural membrane secreting pus, we have a membrane simply irritated by a foreign body, the possibility of a rapid recovery is greatly enhanced. In the one case it would be unsafe to close up a cavity that is secreting pus; whereas, in the other, the removal of the foreign body would suffice to ensure that the cavity would resume its normal functions. I take it that we are all agreed as to the expediency of operating in some form or other. Any question of difference of opinion would be as to the sufficiency of aspiration; as to whether a rib should be resected or not; as to whether the cavity should be washed out; as to whether a drainage-tube be inserted, and if so, for how long should it be retained? I will give, as briefly as possible, my views on these debateable points. Recovery may ensue after one or more aspirations, but the result being extremely doubtful, aspiration should not be used as a curative method. The great object to be attained is the complete removal of the fibrinous masses. To enable one to do this, it is necessary that a large opening should be made; this can only be done by the removal of a part of a rib, and I recommend the resection of two inches of the rib chosen. By so doing one is able to explore a fair extent of the surface of the pleura, and detect the fibrinous masses. As an aid, free washing out is most esential. Sterilised water should be used. Care should be taken that there is no hindrance to the outflow. I have invariably "washed out," and never yet have I had any reason through untoward symptoms to regret the treatment. I think it wise to insert drainage-tubes, though I believe that in some cases they are unnecessary. If one could be sure that the cavity was completely free of the masses, there would be no reason why the tubes should not be dispensed with. Another reason for using one is that the irritated pleura continues to secrete excessively for a short time after the removal of the offending material; but this action rapidly subsides. If a free exit is given to this secretion, it will soon cease. I believe it is only necessary to retain the tube for twenty-four or forty-eight hours; the wound remains open for another similar period, after which time it is usually unnecessary to change the dressing. Should there be a rise of temperature with some accumulation of fluid, a Lister's forceps may be inserted into the wound, and the fluid evacuated; this may be required to be repeated, but rarely is such the case. If the pleural cavity has been well irrigated, nature is fully competent to

absorb any excessive pleural effusion and any attenuated remains of the original disease. In my previous paper on this subject I gave several illustrative cases bearing on the views and treatment I have enunciated, so I will content myself now by reading the notes of a more recent one, which I think will speak for itself.

Dollie T., aet. 5 years. Illness stated to have commenced six weeks ago with influenza, followed by pneumonia. Her mother died from same disease a week ago. First seen by me on the morning of October 1st. On examination on October 2nd, her condition was as follows:—Very frail; much emaciated; temperature, 98·4; respiration, 50; pulse, 134; considerable dyspnœa—series of short dry coughs; no expectoration; apex-beat apparently not displaced; heart's sounds normal; very little movement of right chest; percussion note hyper-resonant over region of right apex—dull over remainder of right chest; note not too good over left base; bronchial-breathing over nearly whole of right lung; respiratory murmur weak over base of left lung; no fluid withdrawn on inserting hypodermic needle into right base. Patient removed to private hospital. On October 3rd chloroform administered with a view to opening chest. Before operating, the use of the exploring-needle revealed the presence of pus. An inch and a half of right 9th rib excised, and chest freely opened; about half a pint of thin pus escaped, together with broken-down fibrinous masses. Chest thoroughly washed out with sterilised water. Medium-sized drainage-tube inserted, and dry gauze-dressing applied; dressing changed two hours later and again at night-time, both blood-stained. Evening temperature, 98·4; pulse, 134; respiration, 38. October 4th: Slept very well; temperature, 98·4; respiration, 40; pulse, 120; less dyspnœa; wound dressed; chest douched. October 5th: Cough troublesome; chest douched, and tube removed. October 6th: Slept well; cough still troublesome; a little serum on dressing; no pus; pulse, 124; respiration, 40; evening temperature, 100. October 7th: Cough very troublesome; chest douched; no sign of pus; evening temperature, 100·6; pulse, 140; respiration, 60. October 8th: Stitches removed; evening temperature, 101·4; pulse, 150; respiration, 50. October 9th: The cough remaining still very troublesome, the evening temperature keeping high, and the pulse and respiration continuing very rapid, the patient was put under chloroform, with a view to thoroughly examining chest. The wound was re-opened, but no pus was present; the chest was douched, and was not further interfered with throughout the illness. The symptoms evidently not being due to anything connected with the right chest, the left side was thoroughly explored, with the result that pus was discovered at the left base. As the collection was palpably only a small one, I purposed only to incise and insert a tube; but finding that I could not thoroughly remove the fibrinous material, I resected a rib, and efficiently douched the cavity. October 10th: Dressing changed—very little discharge; evening temperature, 99·8 October 11th: Chest douched—no discharge; tube removed. October 13th: Cough troublesome, but child rapidly improving in condition; stitches removed. October 15th: The cough still being troublesome, and there being some serous discharge on dressing, the chest was douched, but no sign of pus appeared. The temperatures ranges from 98·6 to 99·8. The cough is apparently the result of habit; child to go out on verandah.

The patient continued to make rapid progress towards recovery. The wound was not subsequently interfered with, and the cough gradually subsided. She went out for a drive on the 20th, and left the hospital on the 23rd., three weeks after her admission. A few days later she proudly showed me how she could run and jump.

I wish to draw your attention to two or three points in connection with this case which have a bearing on my paper. The drainage-tube was only forty-eight hours in the right chest, and though the persistence of symptoms

induced me to open the wound on two subsequent occasions, there was evidently no occasion for such action, the said symptoms being due to that rare condition, a double empyema. The tube in the left chest was removed after forty-eight hours, and although the persistence of the cough induced me to re-open the chest four days later, the result proved that there was no necessity to have done so. There was no further secretion of pus in either pleura after either operation. I believe that in this case recovery would have been uninterrupted had no tube been used; but my experience has taught me that a routine practice of inserting one is the safest and most successful.

In working out this question I have been greatly aided by my friend, Dr. Borthwick, who kindly conducted bacteriological examinations. My former House Surgeons, Dr. H. O. Irwin and Dr. H. M. Evans, at the Adelaide Children's Hospital, also gave me valuable assistance. To these gentlemen I wish to express my sense of indebtedness.

I cannot hope by this paper to convert members to my way of thinking, but I trust that the matter I have laid before them will induce them to think over it, and I believe they will find that I have some reason for the faith that is in me.

Discussion.

Dr. Sydney Jamieson congratulated Dr. Hayward on the excellent results following his method of treatment in these cases. He could not quite agree with Dr. Hayward that these cases were due solely to the influence of the pneumococcus alone, for it did not accord with the experience of the speaker. He had examined, bacteriologically, a considerable number of cases of empyema, but in all cases when pus undoubtedly existed he found, not the pneumococcus alone, but the streptococcus also. In the experience of the speaker, all such cases are really due to dual infections. In his investigation of such cases he had always relied on cultural methods, and not on microscopical technique alone. His plan is to inoculate the suspected fluid upon both blood agar and on bouillon; and in this way he has found the pneumococcus to grow readily upon the former, and the streptococcus upon the latter. By the use of the microscopical examination alone he thought the presence of the streptococci was apt to be overlooked.

Dr. Howard said that he thought there was a considerable risk in administering an anæsthetic in these cases.

Dr. Wilkinson said that he was compelled by his own experience to take exception to Dr. Jamieson's view, that in empyema the purulent condition is always due to streptococci. Not only in the pleura, but in joints, in the cranial cavity and elsewhere the diplococcus lanceolatus may produce purulent inflammation. There are degrees even of purulent inflammation. The effect of streptococci can hardly be distinguished from that of diplococci lanceolati by naked eye appearances, except that the capsulated diplococci may produce the more intense changes. Lately, Neufeld has shown that these diplococci may cause typical erysipelas when they are injected into the rabbit's ear. In one remarkable case of purulent arthritis involving both knees, there was also purulent inflammation of both testes, beginning appearently in the tunica vaginalis, and spreading thence to both testes. The speaker isolated the capsulated diplococcus in this case, and injecting the pure culture into guinea pigs, produced the typical picture of septicæmia. A pure culture was recovered from the heart's blood and from the organs. The diplococcus lanceolatus has a wide field of action in various tissues, but he had searched records in vain for a case similar to this—acute inflammation of both testes caused by the diplococcus lanceolatus.

Dr. Todd wished to endorse Dr. Howard's statement to the effect that anæsthetics had a certain element of risk in empyema. He had seen two deaths from this cause. His own practice in adults was to resect a piece of rib, so as to ensure free drainage—the most important factor in bringing about a cure—to flush the pleural cavity, and to introduce a fair-sized drainage-tube, which should not be removed too soon.

Dr. Verco was disposed to question the assertion that pus in the pleura was always due to staphylococci, or streptococci, and was never caused by pneumococci alone. In some cases only the latter had been found, as also in a case of pus in the knee-joint, complicating a left pleuro-pneumonia. He did not think there was much danger in giving an anæsthetic in empyema, and had always used one during operation. He preferred removing a portion of a rib. Leaving out the tube after two or three days was a great advance, resulting from the recognition of the pneumococcal origin of the pus, and had greatly reduced the duration of the treatment.

Dr. Hayward expressed gratification that this paper had elicited such an interesting discussion. The observations of Dr. Jamieson as to the presence of streptococci in the pus of empyema had surprised him. For some years past he had sent specimens of pus to the Institute of Hygiene at Adelaide for examination, and in every case in which there had been no previous aspiration carried out, the report received was to the effect, either that a pure culture of the pneumococcus was obtained, or that no bacteria were present; in no such case had streptococci been obtained. He thought that the statistics of bacteriological examinations given in Fowler and Godlees "Diseases of the Lungs" corroborated to a great extent this experience. He would not enter into the question of the various details raised, but would once again call the attention of members to the main contention of this paper, namely, that the fluid present in empyema was not a serous effusion that had become purulent, but that it was the result of the breaking down of fibrinous masses (it was questionable whether it should be called "pus"), and that the pneumococcus was responsible for the disease.

EPIDEMIC CEREBRO-SPINAL MENINGITIS.

BY

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The occurrence in Australia during the last two years of a considerable number of cases of epidemic cerebro-spinal meningitis seems to me of such serious import as to justify us in devoting a little of our time during this meeting to its consideration, and I purpose to lay before you a few notes of cases which have come under my personal care in both private and hospital practice, and also to refer to some of the cases which have occurred elsewhere.

Case 1.—The first case in private was that of a young lady, A.M., age 28, whom I saw on 10th March, 1900, complaining of severe frontal headache and vomiting. Her temperature was 101° F., and she was restless and ill at ease; her pulse was 100 per minute, and rather soft; breathing slightly quickened; bowels bound, and the appetite poor; tongue foul. She had been quite well till two days before, when she complained of slight headache and tiredness. I ordered a calomel purge and some salicylate of soda. Next morning she was decidedly worse; the headache was more intense, and had spread all over her head and down her neck; there was distinct squinting, and the head was retracted; the vomiting was almost constant. Her tendon reflexes were absent, and she had a slight herpetic eruption round her mouth. Kernig's sign was present. She was slightly delirious, and face slightly flushed. The pupils were equal and somewhat contracted, and responded only slightly to light.

I considered the case one of acute cerebro-spinal meningitis, and asked for a consultation, which was decided on, the two consultants agreeing in the diagnosis.

She rapidly got worse, becoming comatose the next day; twitching of the facial muscles also appeared; retention of urine set in, with obstinate constipation; the conjunctivæ became acutely inflamed, and she lay with her eyes wide open. She died on the seventh day after I saw her, and probably on the ninth day of the disease. No *post mortem* was allowed, but I think that there could be no doubt of the diagnosis of epidemic cerebro-spinal meningitis, for two reasons, viz., the acuteness of the symptoms and early appearance of meningeal symptoms, and the occurrence of other cases at the same time.

The family history was free from any tubercular suspicion.

Case 2.—C.C., aet. 7, son of a fellow practitioner and friend. I was asked in April, 1900, to see this child by his father, who stated that the child had been ill for about a week before he became alarmed, complaining of pain in his head, and declining to take his food; he also complained of feeling tired, and always wished to lie down. The day before I saw him he had vomited two or three times, and his father, becoming very alarmed, asked me to see him.

On examination I found him lying flat on his back; face flushed and anxious; pupils slightly dilated; head retracted to a slight extent; temperature 102° F.; pulse 100, soft, and easily compressed, but quite regular; tongue coated and tremulous. There was general hyperæsthesia over the whole cutaneous surface of body and limbs, but not specially marked in one part more than another. The knee-jerks were very active, perhaps exaggerated, but the other reflexes were normal. There was no herpes and no rash, petechial or otherwise. Kernig's sign was absent; also Babinski's. Vomiting was now very frequent, and the bowels bound.

He was perfectly conscious, and answered my questions rationally. We agreed that it was a case of cerebro-spinal meningitis, and the head was shaved and a fly-blister applied to the nape of the neck and along the cervical spine for about 2½ inches. He was ordered 2 grs. calomel, and, after it acted, 5 grs. of pot. iodid every four hours.

For the next ten days he steadily got worse; the vomiting became incessant, and as a result, extreme emaciation set in; squinting appeared on the sixth day, and incontinence of urine; slight general convulsions occurred twice; and on the tenth day it was noticed that he had complete paraplegia. The temperature varied from 101° F., and the case appeared hopeless; but, after remaining almost *in statu quo* for some ten or twelve days more, he commenced to improve, and after a tardy and lengthened convalescence of three months, he recovered, the last symptom to give trouble being the loss of power in his lower limbs. He is now quite well and strong; but in this case, again, I think the diagnosis undoubted.

Case 3.—C.G., aet. 26, solicitor. This patient came to my consulting room on 8th August, 1900, stating that for two days he had been suffering from an intense headache, so persistent that he was quite unable to sleep, or work, or even to sit still. His temperature was 102° F.; pulse 96, and soft, but regular; tongue coated; bowels constipated; appetite gone, with nausea if he even saw food. I sent him home to bed, and ordered 6 grs. calomel, with ice-bags to head. Next day I saw him, and found him distinctly worse; he was restless, and crying out with pain in his head, neck, back, and limbs, and his head was retracted. The pupils were contracted to a pin-point, and there was intense photophobia; there was a crop of herpetic vesicles round his mouth, and also on the upper part of chest; his tendon reflexes were all exaggerated, and he had a marked "tache cerebrale," but Kernig's sign was absent. He rapidly became delirious, with intervals of rest, at which times he would be quite rational; but the vomiting was very troublesome all through. The pain on occasion was so intense in his head and neck, that I was forced to give morphia hypodermically, with great relief of pain, thereby securing good sleep. The ice-bags were kept on his head constantly, and I ordered him 15 gr. doses of pot. iodid every four hours, a fair proportion of which he kept down.

He was seen on the fourth day by a colleague—in consultation—who agreed with my diagnosis of epidemic cerebro-spinal meningitis. Our prognosis was a very grave one; but on the eighth day he appeared somewhat better, and rapidly improved, being convalescent on the fourteenth, although weak to a degree and much emaciated. He was unable, however, for three or four months to do any work, and if he tried to do any study it brought on severe frontal headaches and nausea. He is now in perfect health.

In my wards in the Sydney Hospital seven cases at least were admitted.

Case 4.—W.R., aet. 26, carter. Admitted on the 9th October, 1900, in an unconscious condition; said to have been ill for five days only. On the fourth he complained of feeling ill and listless, but continued his work till the sixth, when he suddenly became unconscious, and fell off his cart. He was removed home, and remained in an unconscious condition till brought to the hospital. On admission he was found to be a well-nourished man; very restless, and with difficulty kept in bed; unable to swallow; tongue coated thickly with brownish fur; teeth covered with sordes. There was a crop of herpetic vesicles on the lips; no vomiting or diarrhœa—in fact, the bowels had not been moved for days prior to admission. On examination the lungs and heart were found normal; pulse 84; and temperature 100° F.; all reflexes were normal; urine also was normal. The following day he became conscious and quite rational, but responded slowly to interrogation; he complained incessantly of headache and thirst; he had also recovered his

power of swallowing; pupils were dilated, but equal, and reacted to light and accommodation; photophobia marked; taste normal; hearing acute; no mystagmus; no ptosis; no ocular paralysis; no facial paralysis; no spasm nor loss of sensation; there was no wasting of trunk muscles, and muscular power was good; movements of joints were unimpaired; tactile, thermal, and painful sensations increased over whole surface of body; sphincters unaffected. He gradually became worse, becoming delirious the following day, but constantly complaining of his headache. The photophobia increased, and on the 14th he began to pass everything under him. On the 15th the pulse was 65, and respirations 44; can answer questions, and able to take nourishment and stimulants. On the 16th he became comatose, and died that day.

His temperature ranged from 98° F. to 100·8° F., so was never very high; pulse varied from 82 to 65—the latter towards the last. The treatment adopted was a dose of calomel at the onset, and a mixture of potass iodid and pot. bromid. When the pain was very severe $\frac{1}{4}$-gr. morphia was given hypodermically. The diagnosis was epidemic cerebro-spinal meningitis.

Post-mortem: Body well nourished. Thoracic cavities both healthy, no fluid; no adhesions. Right lung slightly congested, no cadema, and otherwise normal; left lung similar to right. Heart and pericardium normal. Spleen, liver, and kidneys congested, otherwise normal; all other abdominal organs healthy.

The Nervous System.—Nor cortical evidence of meningitis; the meningeal vessels of cortex were engorged. At the base of the brain, over the pons and medulla, there was a viscid, pale yellow, purulent exudate in the sub-arachnoid space; it extended back to and was particularly thick and well marked in the cerebellar fissure; it did not spread out into the cerebellar lobes. It was fairly thick over the anterior aspect of the upper part of the cervical cord; but below this, in most of the cervical, dorsal, and lumbar regions, it appeared to be confined to the posterior aspect, and to be patchy—*i.e.*, more marked in some parts than others, but thicker over the lower part of the cord. The surface vessels of the cord, especially in the lumbar region and commencement of cauda equina, were considerably engorged. There was considerable softening of the brain-substance in the neighbourhood of the exudate, viz., the pons, medulla, and round the lateral ventricles, into which there was an abundant turbid watery effusion.

Films taken from the spinal and basal pus showed a few clumps of organisms, morphologically like diplococcus intra-cellularis meningitidis, and a few encapsuled diplococci, and a few like Fræenkel's diplococci.

Case 5.—I.W., widow, aet. 40. Admitted 5th October, 1900, in a comatose condition. Illness began three weeks prior to admission, with headache and general malaise. She gradually became worse, and vomited on many occasions; had severe epigastric pain of an almost constant nature, but not influenced by taking of food. On admission: She lies on her back, apparently oblivious of her surroundings; temperature 99° F.; pulse 100; respirations 20; skin dry and harsh; no rash; no wasting; no chest nor heart complications; appetite poor; great thirst; no vomiting since admission; lips and teeth covered with sordes; tongue coated with thick brown fur; bowels constipated. She had occasional rational intervals, when she responds slowly to questions. Speech thick and scanning; pupils equal and dilated—react to light and accommodation; no ocular paralysis nor nystagmus, but slight ptosis; no impairment of other cranial nerves.

She remained much in this condition till 10th, when temperature became normal and her headache disappeared; and from this onward she gradually improved, with the exception, that extreme restlessness took the place of the semi-comatose condition; this latter state of matters continuing till the

30th, when her condition seemed to have cleared up completely. She was, however, in an extremely weak condition, particularly with regard to her lower limbs, and was not able to walk alone until the 15th of the following month, from which date she recovered rapidly, leaving the Hospital on the 27th November, 1900, being seven weeks after admission and ten weeks after onset of attack.

Her temperature was never high while in hospital, the highest being 100·6° F., and the lowest 96·4° F.; but my impression is that the disease was already tending to recovery ere she was brought to the Hospital. Her sphincters were normal all through.

The treatment consisted of an initial dose of calomel, stychnine, and digitalis. Morphia injection, when necessary, and bromidia for sleeplessness.

Case 6.—John Burns, aet. 10, schoolboy. Admitted 2nd November, 1900, complaining of headache and pain in neck, said to be due to sunstroke. Previous to this he had enjoyed perfect health. Family history good; no epilepsy.

Present illness began five days prior to admission. He had gone out to a picnic feeling quite well, and whilst there he became suddenly ill; he felt feverish, complained of severe headache, vomited, and was quite prostrated. After removal to his home he became worse, being feverish, restless, and sleepless.

Stiffness and retraction in the neck was a prominent symptom in the attack, and was worse than the pain in head.

Present condition: Patient is very listless; temperature 101·4° F.; pulse 96; respiration 24; skin dry and hot; no rash; face flushed; eyes bright, with pupils widely dilated. There is no anæmia of mucous membranes, and no enlargement of lymphatic glands. Chest practically clear, with the exception of a few râles over left side; pulse full and bounding; heart-sounds are regular—in the mitral area the first sound is replaced by a soft blowing murmur, which is not conducted to the axilla; no precordial friction; tongue furred; edges and tip clean; appetite poor; very thirsty; no vomiting on admission; bowels confined; nothing abnormal noted in abdomen; urine 1020, acid, no albumen.

Nervous system: Patient is an intelligent boy; has severe headache; no delirium; no convulsions; no vertigo; speech normal; smell and taste normal; nothing abnormal detected by opthalmoscope; pupils equal, and react to light and accommodation; no ptosis; no ocular paralysis; no nystagmus; no facial paralysis or spasm; sensation and sphincters normal.

Reflexes: Knee-jerks present; no ankle clonus; plantar reflex normal; abdominal and cremasteric reflexes readily obtained; Kernig's sign well marked. Widal's test gave negative result.

On November 5th he vomited several times. On the 7th temperature rose to 103·2° F., and varied from that to 104° F. till the 5th of December, when it became normal, and remained so. On 14th November, up till when the headache had persisted, he became comatose, and remained so for twelve hours. On 15th he was conscious, but complained of great pain in neck and back of head. On 16th temperature 103·8; headache; flushed face; eyes brilliant; pulse 100; respirations 24. 21st November: Temperature 97° F.; seems much better; flushing of face gone; appetite better; headache disappeared for first time; all reflexes exaggerated; no hyperasthesia. 24th November: Temperature rose to 104° F.; no headache; blood counted—red corpuscles 4,000,000, white 18,000. 28th November: Temperature 99·5 F.; pulse 104; becoming much emaciated; midriasis marked; no headache; constipation marked. 29th November: Another relapse; semi-comatose. 30th November: Rallied again, but headache has returned slightly; in afternoon (5.30) of same day, however, he became worse; screamed with pain, and head retracted. Temperature 99·2° F.; pulse 94;

respirations 26. He was given $\frac{1}{10}$ gr. morphia hypodermically. At 8·30 pain easier, and only in back of neck; frontal headache gone; temperature 102° F.; pulse 144. Vomited repeatedly since 6 p.m.; thirst insatiable. 1st December: Much easier; headache less severe; tongue red and furred. 3rd December: Pain in head and neck easier; pulse good; temperature 99·4° F.; very drowsy; pupils dilated still, but react to light; reflexes now normal; altogether better. 8th December: Remained drowsy till today; no vomiting; no pain; marked proptosis. Nutrient enemata been given for days; stopped to-day.

From this on he improved slowly, but steadily, his appetite returning very gradually. Pain and headache never returned. On 27th December he was able to sit up, and was dismissed cured, on 9th January, 1901.

The treatment consisted of calomel at the commencement, and a mixture of pot. iodid and pot. bromid; when in great pain and screaming, hyoscyne was given, but did not give much relief, then morphia in doses of $\frac{1}{10}$ gr. was exhibited with marked benefit. Diet was nutritive, and when comatose nutrient enemata were given; when convalescent a mixture of syr. ferri iod. and maltine was ordered. Ice-bags were kept applied to the head till 8th December.

Case 7.—Eliza Slaney, aet. 16. Admitted 3rd August, 1900, complaining of intense pain in head and vomiting, of four days duration. Four weeks previous to the onset of this attack, she had suffered from acute pleurisy with effusion, for which she was aspirated, and made a complete recovery. When admitted she had intense headache, persistent vomiting, photophobia, dilated pupils, head retracted, tache cerebrale, and an erythematous eruption on abdomen and legs, but no herpes. Temperature 101° F.; pulse 84; no chest symptoms; pulse same evening increased to 140, and she was screaming with the pain in head. The plantar reflexes were absent, but knee-jerks were active; abdominal reflexes normal; pupils equal, and reacted to light; tongue furred; constipation marked. From this she steadily became worse, coma supervening on the 6th, on which day pupils were noted to be unequal. On the 10th she was unable to swallow, and feeding by nasal tube resorted to; on this day her temperature suddenly rose to 103° F., and pulse to 140; her breathing became rapid and distressed. On examining her chest the lungs and pleuræ were free of mischief, but signs of acute endorcarditis were present over the mitral and tripcuspid areas. On the 14th she appeared much better; temperature normal, and she could be roused; pupils equal, but *no* response to light. She suddenly collapsed on the 15th, and died, but no *post-mortem* examination was permitted.

A remarkable feature of this case was the appearance, five days before her death, of acute endorcarditis, from which, presumably, her death was directly due.

Case 8.—Stella Bourne, aet. 7. Admitted 30th October, 1901. She had all the cardinal symptoms of epidemic cerebro-spinal meningitis, from which she had been supposed to be cured some months ago, and had been discharged from the hospital under that impression.

There was nothing unusual in the clinical notes, except that her temperature reached 105° F. on one occasion, viz., just before death; otherwise, it was between normal and 101° F. Pulse varied from 120 to 150; respirations generally over 30. She died on 17th November, 1901.

Post-mortem: Considerable plastic exudation in the interpeduncular space in the Sylvian fissures, and to a less extent over the base of brain generally, and in the subarachnoid space of the spinal cord. The exudate was examined and found to contain numerous meningococci intracellulares.

Case 9.—Henry Lowe, 23. Admitted 5th October, and died on 7th October, 1900. He presented all the classical symptoms of the fulminating or " Foudroyante " type, but no *post mortem* was obtainable.

In this case the man was acutely delirious on admission, but coma rapidly supervened, and his respiratory centre was early involved.

Case 10.—Wm. Purcell, aet. 26. Admitted 9th October, 1900. The symptoms in this case much resembled those of the last, but were not quite so acute. He died on 16th October, 1900, and no *post-mortem* examination was allowed.

In addition, there were admitted into the Sydney Hospital three cases under Dr. Jenkins, one of whom, a female aged 15, recovered; and a female age 42, and a male aged 42, both of whom died. In the case of the latter, a *post mortem* was held, and the meningococcus intracellularis found.

Under Dr. Dixon there were two cases, both males, and both of whom died; ages, 2½ and 32. Under Dr. Jamieson six cases were admitted, all of whom died; five were males, and one was a female; their ages were 17, 17, 19, 21, 23, 24. In most of these cases *post mortems* were held, the exudate found in all showing the presence of the meningococcus intracellularis.

In several of the cases above-mentioned the diagnosis was confirmed before death by means of a lumbar puncture, which revealed the presence of the diplococcus intracellularis meningitidis.

In all, there were thus 18 cases presenting the symptoms of epidemic cerebro-spinal meningitis admitted into the Sydney Hospital between September, 1900, and October, 1901; 15 died, and 3 recovered. The death-rate was thus, 83·88 per cent. Fifteen were males, and 3 females. Their ages varied from 2½ to 43.

In the *Australian Medical Gazette* of 20th September, 1901, Dr. Sinclair Gillies reported 16 cases which had occurred in the Prince Alfred Hospital, Sydney, with 11 deaths and 5 recoveries; and in the same journal of 20th November, 1901, Drs. Hampden Carr and R. W. Stewart, of Port Pirie, South Australia, give some interesting particulars of an epidemic which occurred there in August, 1901.

I have also been kindly supplied by Dr. John McPherson, of Sydney, with brief notes of four cases which occurred in his practice while he was in Glen Innes, New South Wales.

The first case was that of a baby a few months old, which presented all the typical signs, plus cheque—Stoke's respiration—and only lived three days.

The second case was that of a boy, aet. 7, who died in five days; this case was fully reported in the *Australian Medical Gazette* in November, 1899.

The third case was that of a boy of 2½, in December, 1900, who was only ill 18 hours. The onset was sudden, commencing with marked vomiting, rapidly followed by delirium, constipation, followed by incontinence, muscular spasms, coma, a temperature of 106° F., and death.

The fourth case was that of a boy aet. 8, in June, 1900. The onset was gradual, commencing with severe headache, muscular spasms, cutaneous hyperæsthesia, muscular pains, strabismus, inequality of pupils (no convulsions), delirium, followed by coma, supervened, and he died in 14 days; there was no cutaneous eruption, and he had several remissions.

Dr. McPherson remarks, that in none of these cases was there any connection with pneumonia or influenza; he further significantly states, "As regards Kernig's sign, I noticed it marked in a relapse of typhoid in a young girl, where there was not the slightest suspicion of meningeal trouble."

Dr. Herschel Harris also mentions the case of a young lady, aet. 23, which occurred in his practice in September, 1901. She suddenly became ill, with violent headache, vomiting, a rigor, pain in neck and all along vertebral column, early squint, double herpes zoster in 36 hours, muttering delirium followed by coma, chemosis of both eyes. Kernig's sign was present, but not Babinski's. Temperature varied from 101° F. to 105° F. at death,

which occurred in three and a half days. Tongue foul all the time; pupils at first contracted, then widely dilated; pulse at first rapid, then slowed down. No *post-mortem* was made.

I had hoped to be able to give particulars of cases which have occurred in our other local hospitals, but this I am unable to do; nevertheless, I have quoted a sufficient number to show beyond doubt that Australia has been visited, for I believe the first time, by an epidemic form of cerebro-spinal meningitis. This seems to me a very grave matter, for history shows that once it has made its appearance in a country it is prone to recur at intervals.

Diagnosis.—As to the diagnosis of these cases, I think that in all it was fairly well established, viz., the rapid onset of meningeal symptoms, and the fact that there was an epidemic prevailing of meningitis cases. In most there were skin eruptions; in some Kernig's sign, although I do not think it at all pathognomonic; in all the extreme headache and vomiting; in a fair number muscular spasm and cutaneous hyperalgesia were present; while delirium was present in all. Retraction of the head obtained in most. Several of the diagnoses were confirmed before death by lumbar puncture, quantities of the meningococcus intracellularis being found in the fluid drawn off.

As regards treatment: In the early stage I think a mercurial purge is of advantage, and if the stomach can bear it, a mixture of sod. sal. or sod. iodid, combined with bromide. If the pains and headache are severe, and great restlessness be present, there is no drug like opium or morphia. Ice-bags to the head and neck are often of great benefit in the way of relief to pain, and fly-blister to nape of neck and along the spine have their supporters. The diet must be light at first, and if the vomiting be intractable, it may be necessary to resort to nutritive enemata: if they should recover, during convalescence a light, nourishing and stimulating diet should be given, and quickly improved and increased, as rapid emaciation is the rule.

Personally, I think that as soon as the case is suspected as one of cerebro-spinal meningitis of the epidemic type, it should be isolated as rigidly as cases of plague, for there can be no doubt of the epidemic nature of the disease, and possible infectivity.

With regard to lumbar puncture, I think it should be resorted to in every case of meningitis with spinal symptoms, as it is a most valuable aid to diagnosis, and cannot, in careful hands, do any harm; moreover, it often affords immense relief by relieving tension in the meninges.

Before concluding, I should like to point out—(1) that in epidemic cerebro-spinal meningitis we have the most fatal of all epidemic diseases; (2) that we have undoubtedly had an outbreak of it in Australia during the last two years, probably far greater than any of us suspect, for in all probability many cases of a mild nature have been classed and treated as influenza or enteric, and so overlooked; (3) that it is prone, if not certain, to recur; and (4) that if any good is to be done by treatment, it is in the early stages, and as a corollary, it must be diagnosed early. It behoves us all, therefore, to be on our guard, and where any cases come under our notice presenting symptoms of meningitis, to perform a lumbar puncture.

I must apologise for the fragmentary character of this paper; but it was written very hurriedly, and for the purpose of eliciting some discussion on the subject.

Discussion.

Dr. Officer thought that no one could appreciate Dr. Hood's paper too highly, as to us it was a new subject opened up. In Melbourne, a number of cases were reported, and it was to Dr. W. C. McKenzie that the chief

credit was due, for the earnest way he tackled the subject and founded an accurate diagnosis, and to Dr. White, for his good work in cultivation and inoculation experiments. The speaker had seen four cases in private, and would advise lumbar puncture in every suspected case as soon as accurate diagnosis was necessary. The puncture, under aseptic precautions, was quite safe; years ago he had done a large number in tubercular cases.

Dr. Sydney Jamieson, until a comparatively short time ago, was under the impression that cerebro-spinal fever had not visited Sydney prior to the outbreak last year; his views in this respect were altered, however, by the late Dr. Wright, one of the oldest practitioners in Sydney. Dr. Wright informed the speaker that some 25 years ago an outbreak occurred in a part of Sydney known as "The Rocks." Dr. Wright's description of the disease left no doubt in his mind that the disease, in reality, was cerebro-spinal meningitis. Dr. Hood stated that such cases, when once recognised, should be promptly isolated. For this procedure the speaker could not see the necessity, for the disease, though occurring in epidemic form, was in reality a "place disease," arising in insanitary surroundings, and by no means readily communicated from man to man. In this respect the disease resembled plague. He did not think that Dr. Hood had by any means established the diagnosis of cerebro-spinal meningitis in his second recorded case; and in the case which he regarded as doubtful, the speaker felt strongly that the diagnosis of pneumococcal meningitis was much nearer the correct view. In the speaker's six cases the diagnosis was in five established by lumbar puncture, and in the sixth no fluid was obtained by the puncture. This failure he thought was due to the late period at which this means of diagnosis was used. He thought that in the later stages of the disease the fluid portions of the exudate were often absorbed, and only the plastic material left. This case, however, was subsequently cleared up by *post mortem* examination.

Dr. Verco had had several cases in hospital and private practice. In reference to diagnosis from tubercular meningitis during life, it is probably diplococcal if it occur in adults (in whom the tubercular form is rare), if it have a very abrupt or acute onset, and if herpes be marked. Lumbar puncture, with recognition of diplococcus, of course settles the diagnosis. As to destruction between epidemic cerebro-spinal meningitis and meningitis due to invasion by the diplococcus of pneumonia, he did not think this could be established at present. It was questionable whether the diplococci from a lumbar puncture could, with absolute certainty, be referred to the species causing pneumonia or that of the epidemic cerebro-spinal disease, if two species exist, about which there is some doubt. It is significant that a meningitis due to a diplococcus occurs in an epidemic form, and that pneumonia, also due to a diplococcus, scarcely to be distinguished from it, may also be epidemic. He did not think the cases of meningitis required to be isolated any more than cases of pneumonia. He had not known any communication of the disease from patients treated in a general ward. Any direct action of drugs upon the course of the complaint was doubtful.

Surg.-General Woodward mentioned two outbreaks of cerebro-spinal meningitis that had occurred at barracks in Dublin. The men were put into tents, as the disease was considered very contagious.

Dr. Nihill stated that he had found mercurial inunction useful in these cases.

Dr. Jarvie Hood replied briefly.

THE SERUM DIAGNOSIS OF DISEASE, WITH SPECIAL REFERENCE TO THE REACTION IN TYPHOID FEVER.

BY

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Within the last twelve months a number of articles have appeared in the medical press, having for their object the belittling of the diagnosis of disease by the methods in use in clinical laboratories. The argument has been adduced that such methods tend to lessen our enthusiasm for the older methods of diagnosis by means of signs, symptoms, and differential selection. It is my object in writing upon the method of serum diagnosis to show that it is a really important additional aid to our powers of accurate diagnosis, and should not in any way lessen our endeavours to arrive at the solution of clinical problems by the close observation of signs and symptoms. So early as 1889 Charrin & Roger found that the bacillus pyocyaneus, when grown in the fluid serum of an animal immunised against that bacillus, did not produce the usual tubidity of the culture medium, but rather showed a tendency to form little clots, which separated if the tube were shaken, and fell to the bottom. This was in reality the first observation of what is now well-known as the phenomenon of "agglutination." This observation was not at that time recognised as of importance. In 1891 Mitschnikoff noted a similar condition in connection with the bacillus bearing his name, and also with the bacillus lanceolatus. In 1893 Issaef confirmed these observations on the bacillus lanceolatus. Still, no importance of special note was attached to the phenomenon. In 1894 Pfeiffer showed that in the peritoneal cavity of normal guinea pigs the cholera vibrio multiplied with great rapidity, and showed no change of morphology; while in immunised guinea pigs the vibrios were quickly immobilised and broken up into small granules. This was known as "Pfeiffer's Phenomenon."

This reaction was regarded by Pfeiffer as "specific," *i.e.*, it does not occur when any organism other than the cholera vibrio is put into a guinea pig immunised against cholera, nor when the vibrio is put into normal guinea pigs, or those immunised against other micro-organisms. In 1895 Bordet showed that the change was also noted when the experiment was conducted "in vitro." In 1896 Durham, working in Grueber's laboratory, first systematically studied the agglutinative reactions. He applied both macroscopic and microscopic tests, showed the importance of dilutions, the value of the differentiation of bacterial species, and the influence of previous attacks in the case of typhoid infections.

In June, 1896, however, Widal, for the first time, pointed out that the reaction of agglutination is present, not only in the serum of immunised animals, and in the blood of convalescents, but also during the period of infection. He, then, was the first to apply the reaction as a means of diagnosis of typhoid. This discovery was soon confirmed by other observers, and during the past five years a vast amount of work has been carried out in various parts of the world, all of which more or less confirms the value set upon the tests by Widal. The test may be applied in various ways; viz.:— 1. With fluid serum or blood; 2. By means of dried blood; 3. By means of sedimentation in tubes. Of these methods, the first is used by most observers, and is by far the most useful and most rapid.

For the purposes of the test the blood may be drawn from the cleansed finger-tip or lobe of the ear.

Method.—A single loopful of blood or fluid serum from the suspected case is mixed on a slide or cover glass with 20 or 40 times its volume of a young actively motile culture of the typhoid bacillus, and if within a certain fixed time-limit the phenomenon of agglutination is observed in the microscopic field, the " reaction " is regarded as " positive."

A " positive reaction " may be said to be observed within this limit of time if the movements of the organisms are first noted to show, and subsequently the organisms are seen to run together and form groups or clusters.

In carrying out the work of serum diagnosis certain precautions are necessary, and there are certain sources of error which must be avoided. In the first place it is necessary to make a preliminary examination of the culture to be used, in order that it may be ascertained that it does not of itself show any tendency to undergo spontaneous clumping.

In the early days of our work in connection with this reaction at the Pathological Department of the Sydney Hospital, we were in the habit of using broth cultures only, and after working with a culture through several generations, we often found that the organisms showed a tendency to clump of their own accord. We found, however, that by using cultures grown on agar agar, and, subsequently, when required for use, making an emulsion of the growth with sterile bouillon, that this fallacy could be readily overcome.

Having ascertained that the culture has no tendency to clump spontaneously, a positive reaction can only be said to ensue when clumping occurs within a certain time and in a certain degree of dilution. A dilution which is correct for one time-limit will not do with a longer time-limit. A dilution of 1 in 10, with a time-limit of 15 minutes, used to be thought in most cases quite satisfactory. In order to be more accurate we have, during the past two years, adopted in the laboratory of the Sydney Hospital a dilution of 1 in 20, and a time-limit of half an hour. The method we adopt is to mix upon the slide or cover glass 20 loopsful of a young culture (from 12 to 18 hours old) with a single loopful of blood serum of the patient to be examined. If within the time-limit named a loss of mobility, followed by clumping of the organisms, is seen, the reaction may be regarded as " positive." It is distinctly of advantage to have some blood corpuscles mixed with the serum used, as the focussing of the preparation is thereby facilitated. Instead of using fluid serum, dried blood may be used; but this method is not by any means so advantageous as the fluid serum. If dried blood be used (and it certainly is of some advantage when the specimen has to be sent some distance by post), then the blood should be collected either upon a piece of glass or glazed paper. When required for use, the blood is simply dissolved in water, and the mixture of blood and water added to the culture as in the serum method. Some observers, such as Wyatt Johnston, have used the dried-blood method largely, and regarded it as quite as accurate as the fluid serum.

Again, instead of using living bacilli for the test, dead cultures, killed by exposure to a heat of 60° C. for half an hour, may be used; and this method has, in the hands of some observers, proved equally efficacious as the living culture. The great advantage of this method, of course, is that the culture so treated may be readily preserved, carried about, and used at the bedside. It is found that the most potent sera do not always occur in the severest nor in the mildest cases. Sometimes it is highest at the beginning of the illness and sometimes at its close. In fatal cases the potency of the serum may fail as death approaches, but this is not always the case. The agglutinative power of typhoid blood varies a great deal in different cases and at different times in the same case; but as yet, the causes of these variations are entirely unknown.

Widal calls a reaction " very feeble " if the limit of its power to agglutinate be under a dilution of 1 in 100; " feeble " if the limit be between 1

in 100 and 1 in 200; "moderate" when it is between 1 in 200 and 1 in 500; "intense" when it is between 1 in 500 and 1 in 2000; and "very intense" when the limit is over 1 in 2000. It is even possible to get an agglutination limit of 1 in 12,000. The susceptibility to clump varies with different strains of typhoid bacilli. Mills used 28 different races, and found them to differ considerably from one another. He considered that the rate of clumping varies inversely with the virulence of the organism. Fresh cultures from the spleen of typhoid cases, living or dead, are usually very motile and sensitive to serum; but if they be kept in the incubator, and not transplanted, they soon lose their sensitiveness. Cultures kept at room-temperature grow much more slowly, and need transplanting only about once in two or three days. Incubation cultures are best when from 10 to 14 hours old. Twelve-hour cultures at 37° C. correspond roughly to thirty-hour cultures at room-temperatures. On the whole, it is found that the more actively motile the culture, the more readily is it clumped. Most authorities agree on the following points with reference to the suitability of a strain of typhoid bacilli for use in serum diagnosis:—

(1) The culture should show no sediment or pellicle, and should be only slightly turbid.

(2) The presence of long involution forms, of any tendency to spontaneous clumping, or of non-motile or very sluggish bacilli, should lead to the specimen being discarded.

(3) As a rule, such cultures can be made available by a few transplantations, and a short exposure in the incubator.

The stage of the disease at which the clumping-power of the serum first appears differs somewhat in different cases. According to Courmont, at least 93 per cent. of all cases show the reaction within the first nine days. In practice, however, it is very rare for us to see our typhoid patients till they have been about a week ill, so that we may expect, in the majority of cases, to get the reaction within a few days of our first being consulted. Occasionally, however, the first appearance of the reaction is delayed, and it has not appeared in some cases till as long as 36 days after infection. Such cases, however, are very rare. On the other hand, the reaction may appear at an early date, and some observers have found it as early as the fifth day of malaise. The reaction may last but a short time after the attack has passed, and in a case recorded by Elsberg the reaction had disappeared at the end of the fifth week. In the vast majority of cases, however, it lasts for several months. In some cases, however, the power to agglutinate has been retained for many years—as late, even, as 37 years after infection has been recorded.

A possible explanation of such late reactions is suggested by some cases recorded by G. B. Miller in the *Johns-Hopkins Hospital Bulletin* of 1898, Vol. IX., No. 86. A patient was operated on for gall-stones seven years after an attack of typhoid, and live typhoid bacilli were found in the gall-bladder, and the patient's serum reacted in a dilution of 1 in 100. Still more recent observations show that typhoid bacilli may be found in the urinary bladder long after the patient has recovered from the acute symptoms. From these cases it appears to be quite likely that such late reactions are due to the fact that the patient still harbours living typhoid organisms.

An analogous condition of things is sometimes seen in cases of diphtheria, where Klebs-Loffeer bacilli have been detected in the throat for long periods after the acute illness has passed off.

In some cases of typhoid fever it has been noted that the reaction intermits at times, being present one day and absent the next, and so on. Such cases, however, are decidedly of rare occurrence, but the possibility of such an eventuality should be kept in mind.

As to the Value of the Serum Diagnosis in Typhoid Fever.

First of all we must try and ascertain what inference should be drawn from a negative reaction. There is no doubt that in very rare instances the reaction is not obtained, even when the case is really one of typhoid. Such cases have been recorded by Widal himself, among other observers, and in my own work at the Sydney Hospital Laboratory I have seen this exemplified. For this reason we may say that a negative reaction does not of necessity mean that the case is not one of typhoid. On the other hand, we may say that repeated negative results at various stages of the disease are strong presumptive evidence that the disease is not typhoid. A negative reaction in the early days of the disease should not be taken as strong evidence against the disease; but if the reaction still remains negative at the later stages of the disease, the chances are that the case is not one of typhoid. The fact that in some rare cases the reaction intermits from day to day afford a source of difficulty. A negative reaction, then, in a case suspected of being typhoid may mean—

(*a*) That the reaction is delayed, and will appear later;
(*b*) That the reaction has been in existence, but has passed off;
(*c*) That the reaction has perhaps intermitted;
(*d*) That the reaction is not obtainable, even though the case is one of typhoid;
(*e*) That the case is not one of typhoid.

In 98 per cent. of cases the last will be the correct inference, provided we can satisfactorily exclude the first three possibilities.

It should also be remembered that in about 90 per cent. of cases the reaction is present at the time the patient first seeks medical aid, for the great majority of cases do not consult a doctor within the first week of their feeling ill.

What is the real significance of a positive reaction? It must not be forgotten than spontaneous clumping is apt to occur in cultures, especially in old bouillon cultures, or in those repeatedly incubated. This fallacy may be overcome by the means already indicated. Again, in cases where the dilution is high, it must be remembered that clumping may occur with sera other than typhoid. This, of course, may be avoided by using a dilution of 1 in 40 or 1 in 50. A person may pass through an attack of typhoid previously without the true nature of the illness having been recognised, and in such cases a positive reaction would be most misleading. There can be no doubt, also, that many of the pseudo-reactions recorded are due to faulty technique and inexperience of the test on the part of the observer applying it. The absence of the usual naked eye intestinal lesions can now no longer be regarded as proof of the absence of typhoid infection. Examples of undoubted typhoid without the characteristic intestinal lesions have, within the last few years, been recorded by several able and trustworthy observers. Unless the spleen, liver, mesenteric glands, and gall-bladder have been carefully examined by bacteriological culture methods, the evidence against typhoid infection is insufficient. Most authorities, who have used the test for some time and who are thoroughly acquainted with its technique, are now of opinion that a positive reaction means typhoid infection past or present, provided the test is properly carried out. Given a case of fever and a positive typhoid serum reaction, we must bear in mind that the typhoid infection which the test proves may be smouldering in some internal organ, such as the gall-bladder, urinary-bladder, or bone-marrow, due to an attack previously occurring, but not recognised at the time. In connection with the testing of the blood in suspected typhoid infection in cases where the reaction is not quite satisfactory, additional accuracy may, I think, be obtained by the white cell blood-count and by the diazo reaction of Erlich. In the great majority of cases where the disease is well established, there is a marked

leucopœnia. The diazo reaction, it is true, may occur in diseases other than typhoid, *e.g.*, tuberculosis; but as an additional test as a means of corroborating the serum reaction it should not be disregarded. Such a combination as a positive Widal reaction, together with a leucopœnic condition of the blood, and a positive diazo reaction in the urine, would, to my mind, afford practically indubitable evidence of present typhoid infection.

Having now discussed the serum diagnosis in regard to typhoid infections, I will add a few remarks on the value of the test in other infections.

Malta Fever.—This disease, on purely clinical grounds, is practically indistinguishable from typhoid; but by means of the serum reaction the two may readily be discriminated from one another. To Wright, of Netley, is due the credit of having established the value of the test in this disease. Aldridge examined thirty cases by the serum method, and in every case got a positive reaction with the micrococcus melitensis almost instantaneously in dilutions of 1 in 10, and within half an hour in dilutions of 1 in 100.

Cholera.—The cholera vibrio being easily cultivated, and being very mobile, lends itself readily to the test. In this disease the reaction is obtainable in dilutions of 1 in 20, and, in some cases, in even higher dilutions, as a rule within ten minutes. Pfeiffer, however, found the reaction to occur, when normal serum was used, even in dilutions of 1 in 20. So far, however, the value of the reaction is somewhat uncertain, as sufficient experience has not yet been obtained to ascertain the true value of the test as applied to cholera.

Bubonic Plague.—The German Commission sent to Bombay to investigate the plague, found that the blood serum of plague-stricken patients produced a marked agglutinative reaction when mixed with culture of the bacillus pestes. As a means of diagnosis, this test is of but secondary value when compared with the ordinary bacteriological procedure.

Pneumonia.—The reaction has been observed by some observers; but negative results have been obtained by others. On the whole, the test in the case of this disease is but of little real value, except as a means of distinguishing the pneumococcus of Frænkel from other closely allied diplococci.

Tuberculosis.—A marked clumping reaction has been obtained in this disease by some observers. As a test, this reaction is not to be compared in accuracy with that of tuberculin or the ordinary bacteriological methods.

The serum test has also been applied with more or less satisfactory results in a number of other micro-organismal diseases, *e.g.*, yellow fever, glanders, tetanus, diphtheria, and in streptococcal and colon bacilli infections, but the results obtained, though of scientific interest, do not promise to add much to our means of distinguishing these pathological conditions.

In conclusion, I will quote a passage from the remarks of Dr. A. C. Houston in the discussion upon enteric fever in its public health aspects at the last annual meeting of the British Medical Association. Speaking on the subject of the value of Widal's reaction in relation to the early diagnosis of typhoid, he says—

"As the value of this test in diagnosis is beyond dispute, it seems a great misfortune that medical men do not use it more often.

"The earlier the diagnosis, the sooner is the patient removed to hospital, or, if treated at home, suitable precautions taken as regards cleanliness and disinfection, and the sooner is the cause of the disease sought for, and, if discovered, remedied.

"It is clearly the duty of medical men to notify cases of enteric fever as early as possible, and it is equally certain that Widal's test may greatly help them in forming a diagnosis.

"If they persist in neglecting to avail themselves of the advantages of Widal's test, in at all events doubtful cases, they are not doing their full duty either to their patients or the general public."

THE WIDAL REACTION: ITS PRACTICAL WORKING AT SYDNEY HOSPITAL,

BY

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AND

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Resident Pathologist.

One of the most common beliefs about the Widal reaction is, that if the result is not "positive," it must be undoubtedly "negative." Now, this is far from being the case; there are a certain number of reactions which are on the border-land between the two, and it is with these that judgment and great experience of the reaction are necessary. For instance, after the lapse of, say, 50 or 60 minutes, there may be a few small clumps present; these will hardly be sufficient on which to call it a positive reaction, yet we have no doubt that (provided the culture be good) these clumps have some significance; they may be interpreted in one of two ways—(*a*) either that the patient is in the early days of an attack of typhoid; or (*b*) that he has had typhoid previously, some of the antitoxin which he then formed still remaining in his blood and exerting a feeble clumping-action. In a few cases patients suffering from chronic diseases have given this very feeble clumping reaction, and we have not been able to definitely trace a past history of typhoid; but, as frequently the disease is mild and goes by other names, the question is by no means settled by the patient's statement. Our grounds for saying that even slight clumping has some significance is that we have watched the action of blood of numberless diseases on the typhoid bacilli, and, with the exception of a few cases noted elsewhere, there has been no sign of clumping after an hour or more.

It is impossible to write down what extent of clumping constitutes "positive." Different observers might look at the same reaction (provided it is not marked), and yet have different views as to the result. As a rule, in our experience the bacilli, if they are going to clump, will at least *commence* to do so within 20 minutes; in those cases where they do not, the clumping, if it does appear later on, is never very marked, and not of great diagnostic value. It is not necessary for all the bacilli to be clumped; even in marked reactions it is common to see some free and actively motile. Preceding the clumping there is always a diminution of motility; but too much stress should not be laid on this alone, as *without* the addition of blood the bacilli tend to become much slower in their movements after 10 minutes or so.

The intensity of the reaction is not always in accordance with the severity of the disease.

Day of the disease on which the reaction appears.—This is impossible to fix, since it varies so much. This we can say, however, that it is not usually present in the first week. We frequently get it about the eighth day, but never well marked till at least a few days later. The longer the patient has been ill, the more marked the reaction, and it is not at all uncommon for the clumping to have taken place before it can be examined under the microscope. On the other hand, there are a few cases of typhoid which fail to give it throughout their course, but show it during the relapse. This has happened

in several cases, and makes one wonder whether the relapse is in any way due to the deficiency of the antitoxin in the blood. Unfortunately for this theory, however, other cases give the reaction during their course, and also have a relapse.

Technique.—In those cases that date back several years a bouillon culture of typhoid was used, employing nine drops of this to one of blood (a dilution of 1 in 10); thirty minutes were given within which the bacilli must have clumped, otherwise the reaction was written down as "negative." Later on the bouillon culture was given up, and agar substituted. The dilution was also weakened, and the time-limit extended. The method then was as follows:—To take 19 drops of sterilised bouillon, just touch the agar typhoid culture with the edge of the platinum loop, mix this with the bouillon on the cover slip held by forceps, and add one drop of the blood (great care should be taken not to remove too thick a smear from the culture, otherwise the reaction will be spoilt). This method has been adhered to ever since. The advantages it possesses are—(1) the motility of the organisms is better; (2) that we get no preformed clumps, as occasionally happens in bouillon.

The agar culture is at its best when between 12 and 18 hours old. If the reaction of the agar is not correct, viz., faintly alkaline, then the culture will suffer; and without an actively motile culture the test should not be performed. We have made several errors through disregarding this rule, for the blood of typhoid patients may fail to clump sluggish bacilli. The more actively motile the bacilli, the more satisfactory the test. In any case where we are not satisfied as to the condition of our culture, we should control the test by contrasting it with the blood of a healthy person. After the typhoid growth has been sub-cultured a number of times, it tends to become feeble; the best plan, then, is to re-inoculate from a stock culture. The most vigorous cultures are those got from a typhoid spleen.

We have found the lobe of the ear the most suitable place for securing the blood. If it is made hyperæmic by vigorously wiping with dry wool, then one smart stab with a hare-lip pin will secure, without any pain, as much blood as is needed; even more, for only a few drops are required. We generally collect it in a sterilised glass tube which has previously been used for B.W. peptonising powder. If it is allowed to stand for a few minutes, the blood will clot; this may be separated from the glass by the platinum loop, thus allowing the serum to become free; for it is a drop of the serum mixed with a few blood corpuscles that we require. The only reason for sterilising the glass tube is in case of the blood not being tested for some days, in which case, if this precaution has been neglected, there will be a growth of organisms which go into clumps of their own accord, and may be confused with the typhoid bacilli when doing the reaction.

Typhoids that gave a positive result.—Two hundred cases of typhoid were tested, and gave a positive reaction; a few, however, not until the second or third week, and several not until they had a relapse.

Possible cases of typhoid which gave a negative reaction.—No. 1.—A child of 9 years. Ill one week before admission. While in hospital temperature not higher than 100·4°; reached normal five days after admission. Attack commenced with vomiting, purging, and headache, and loss of appetite. Thus, the whole course of the illness was not more than two weeks. Surely, a doubtful case. Blood tested on two occasions.

No. 2.—Female, aet. 33. Ill fourteen days prior to admission. Illness began with vomiting and loss of appetite; no headache. Temperature on admission 103·4°; fell gradually, and reached normal five days later. While the temperature was up, the pulse was frequently *above* 100. Chest clear; abdomen slightly distended. Blood tested on the nineteenth day of illness, and only once.

No. 3.—Male adult. Blood tested on the seventh day of his illness, and not again.

No. 4.—Male, aet. 21. Took ill about May 19th, with weakness, malaise, and anoxenia. Temperature when admitted on May 29th was 101°; never went above 102·2; reached normal on June 3rd. Spots on chest and abdomen.

These few cases do not fully represent the situation, for, as noted above, some patients with enteric failed to react until the second or third week.

Diseases other than Typhoid which gave a positive Reaction.

Disease.	Intensity of Reaction.	Remarks.
Febricula.	—	Past history not inquired into.
Appendicitis.	Feeble	Patient gave a history of several previous attacks of what were said to be the same as his present illness. One of these lasted 11 or 12 weeks. Surely more like Typhoid than Appendicitis.
Puerpural Pyæmia	Fairly marked	Absolutely no history of Typhoid to be obtained.
Myeloid Sarcoma of Femur	Feeble	Never ill before in her life.
Empyema	Feeble	Past history not inquired into.
Septic Endometritis.	Marked	Beyond slight illness for a week (chiefly headache) several years ago, no previous trouble. Tested on two occasions, with an interval of a week. Reaction not more marked the second time.
Gangrenous Appendicitis and Peritonitis.	Marked	No past history of Typhoid. The appendiceal pus was not examined bacteriologically.
Lateral sinus Pyæmia	Marked	Tested on three or four different occasions with the same result every time. Not noted whether the reaction became more marked as the disease progressed. No Typhoid bacilli found in the pus.
Cerebral Abscess	Feeble	Large sub-dural abscess; all the sinuses filled with pus. No past history of Typhoid.
Myxœdema	Feeble	Past history not inquired into.
Measles	Feeble	Past history not inquired into.
Sarcoma of Pituitary body	Feeble	Past history not inquired into.

Looking at the foregoing table, it will be seen that 12 cases gave a positive reaction, varying in intensity; but if the past history of the patients had been carefully inquired into, in many of them, then, we have no doubt that the number would have been reduced. In four of them which gave a marked reaction (that is to say, clumped decisively within fifteen minutes) there was absolutely no history of typhoid; these were most conspicuous failures. The rest of the series only reacted feebly, yet still on the strength of them, typhoid in its first two weeks might well have been diagnosed.

On the whole, however, the number of failures (comparative and complete) is small considering the number of cases tested. Personally, we think that these failures will be cleared up some day.

Diseases which gave a Negative Reaction.

Meningitis (all forms)	13 cases.	Acute Lead-poisoning, with Uræmia	1 case.
Influenza	12 „	Malignant Endocarditis	2 „
Appendicitis (Catarrhal, Suppurative, and Gangrenous)	16 „	Malaria	5 „
Pneumonia (Lobar and Broncho) ...	38 „	Septic Peritonitis	8 „
Febricula	17 „	Lymphadenoma	2 „
Enteritis	8 „	Diphtheria	2 „
Pleurisy (dry and serous)	7 „	Pyæmia (including a Lateral Sinus and 2 Puerperal cases)	5 „
Gastro Enteritis	2 „	Aneurism	2 „
Tuberculosis of Lungs	8 „	Mastoid Abscess	3 „
Acute Miliary Tuberculosis	13 „	Ovarian Cyst	2 „
Nephritis	6 „	Measles	3 „
Nephritis with Uræmia	2 „	Suppuration of Antrum of Highmore	3 „
Pyelitis	1 „	Tonsilitis	4 „
Rheumatism	6 „	Peri-Hepatitis	2 „
Chorea	1 „	Septicæmia	6 „
Empyema	3 „	Syphilis	2 „
Salpingitis	3 „	Cerebral Softening	2 „
Constipation	2 „	Carcinoma	5 „
Bronchitis	2 „	Colitis	2 „
Valvular Heart Disease	3 „	Acute Infective Osteo Myelitis ...	2 „
Gall Stones	3 „	„ „ Periostitis	2 „
Gastritis	3 „	Hydatid	3 „
Abscess of the Liver	2 „	Plague	2 „
Abscess	2 „	Secondary Anæmia	2 „

and one case each of Gastric Ulcer, Duodenal Ulcer, Renal Calculus, General Paralysis of the Insane, Gangrene of the Lung, Exophthalmic Goitre, Lymphangitis, Adenitis, Cerebral Hæmorrhage, Orchitis, Ulcer of the Leg, Chronic Lead Poisoning, Scurvy, Pernicious Anæmia, Chlorosis, Beri Beri, Acute Arsenical Poisoning, Fracture of the Leg, Tubercular Peritonitis, Hæmorrhagic Pancreatitis, Endometritis, Pyo-Salpinx, Cholecystitis, Whooping Cough, Dementia, Ischio-Rectal Abscess, Peri-metritis, Kerosene Poisoning, Acute Dysentery, Sarcoma, Progressive Muscular Atrophy, Ectopic Gestation, Gonorrhœal Synovitis, Phlebitis, Gonorrhœa. Included in the above list are several cases of Jaundice. This, according to some observers, gives a positive reaction. The total number is 280.

It is well to remember that in the wards of this hospital the Widal reaction has commanded great respect, so that, occasionally, cases that clinically resemble typhoid, and might elsewhere be treated as such, but which fail to give positive reactions, are signed up under other headings, such as febricula, enteritis, &c. Most of the cases called febricula were, however, mild cases of pyrexia, without any outstanding cause.

Persistence of the reaction.—Perhaps the most unfortunate part about the reaction is the fact that in many cases it may still be got (less markedly, of course) years after. In one case the patient still reacted twelve years after his attack; and a lesser number of years is comparatively common. That this is not so in all cases is illustrated by one patient, who failed to react fifty days after his temperature had reached normal. The persistence of the reaction does not appear to depend on the severity of the attack.

To distinguish a reaction that is due to a past attack of typhoid in a patient suffering from an acute disease simulating typhoid, we require to do a second test, five or seven days later, and note whether it is more marked than on the former occasion; if so, the current disease is almost certainly typhoid.

Post Typhoid Widals.

No.	Positive.	No.	Negative.
1	Enteric 11 years ago.	1	Had Enteric 2 years ago.
2	" several years ago.	2	" 10 "
3	" 7 years ago.	8	" 30 "
4	" 4 "	4	" 3 "
5	" 10 "	5	" 3 "
6	" 3 "	6	50 days after.
7	" 5 "		
8	" 10 "		
9	" 10 "		
10	" 2 "		
11	" 9 months ago.		
12	" 6 years ago.		
13	" 12 "		
14	" 2 "		
15	" 1 "		
16	" 1 "		
17	" 4 "		

ON THE MEDICINE OF THE TASMANIAN ABORIGINALS.

BY

G. Heuzé Hogg, M.D., Launceston.

It would seem but fitting that at the first Congress of Medicine held in Tasmania some reference should be made to our predecessors in this Island, and with your permission, therefore, sir, I should like to make a few remarks about aboriginal medicine, which is separated only by 100 years from the scientific medicine of the Tasmania of to-day.

And first of all, a word about our own fraternity of physicians and surgeons. It is doubtful whether there were any recognised doctors amongst the Tasmanians. No mention is made of such by the early explorers, French or English, although West, in his history of the Colony, states that some of the natives practised more than others, and were called doctors by the English; and Backhouse mentions an old man, or doctor, who had for his instrument supply a stock of broken glass, which he used as lancets for superficial and deep scarification. This old gentleman suffered from some sort of fits, which were attributed to a devil, and made use of to impose upon his fellows—the first recorded example, doubtless, of a Tasmanian "quack." As to nursing, that was left to the women of the tribe. Confinement cases were left in charge of one or more women, and the sick also were, if attended to at all, nursed by them; although frequently the sick person was left behind by the tribe to take his chance, a stock of food and a supply of the leaves of the mesembryanthemum, a native purgative, being given to him before his desertion. With regard to the surgery of the Tasmanian aboriginals, it was, as might be expected, of a most primitive character. Bleeding was stopped by the application of clay and leaves. Incisions and scarifications were held in much favour in the treatment of various diseases; thus, Truganini treated the swollen thigh of her husband by six incisions, which produced sloughing, and cured him in nine days; and Robinson relates how a woman suffering from sick head, breast, and belly, was incised in each of these parts, the idea in this and similar cases being that the pain was a distinct entity, and must be let out. Billardière, the naturalist of the D'Entrecasteaux expedition, was of the opinion that they used the actual cautery in some diseases—snakebites, certainly, were treated by a kind of cauterisation, a hole being bored in the flesh near the wound and stuffed with fur, which was then singed. Massage seems to have been occasionally employed, and applications of cold by means of compresses were used for the relief of headache and other pains. As to the diseases which prevailed amongst the aboriginals, our knowledge is of the slightest, the early medical men having interested themselves very little in the matter. Before European colonisation, they seemed to have been a healthy race. The scientists of D'Entrecasteaux's expedition found but little trace of disease, although there existed amongst the aboriginals themselves a tradition that their race—at one time much more numerous—was decimated by an epidemic which swept through the island prior to European discovery. After the English colonisation, however, various diseases spread amongst them, syphilis, phthisis, and pneumonia becoming frequent and fatal. Various skin diseases became very prevalent, and were particularly noticed by the early colonists. Thus, they are described by various writers:—(1) Scabby sores affecting the whole body; (2) loathsome ulcerated sores, attended sometimes by fatal results; (3) leprosy, so offensive as to cause isolation of the sufferer; (4) scurvy; (5) eruptive disorder attended by fever. Doubtless, some of these skin diseases were syphilitic, some parasitic. The usual treatment for all skin diseases was

the application of ashes, the patient wallowing in them if necessary. Rheumatism was common, and was treated by scarification and incision; sometimes by mutton-bird oil. Headaches were treated sometimes by cold compresses, sometimes by scarification, sometimes by charms made of human bones; thus, Backhouse relates how one man had a charm of three bones fixed as a triangle on his head as a cure for headache. The use of such charms made of the bones of the dead, often of a dead relative or friend, was common, not only as a cure, but also as a preventative against sickness or death. Lung diseases became very common amongst the Tasmanian natives, and were the chief cause of the final extinction of the race. Inflammation of the lungs was often very rapid and fatal, and phthisis was prevalent, partly because of the alteration of the habits of the race, partly, no doubt, because of the introduction of that disease by Europeans. Some lung troubles were apparently treated by incisions in the chest walls. With regard to nervous diseases, madness and convulsions were known by the aborigines, and were believed by them to be due to an evil spirit; while that peculiar form of melancholia known as nostalgia became a marked feature amongst the survivors of the races interned in Flinders Island, many of whom became the sad victims of that strange disease. Such are the scattered fragments of the knowledge of aboriginal medicine which we possess; yet, fragments as they are, I offer them to your notice, regretting that they, like the rest of the knowledge of this dead people, are so imperfect.

THE NECESSITY FOR THE STUDY OF TROPICAL MEDICINE IN AUSTRALIA.

BY

F. Goldsmith, M.B., B.Ch.,
Palmerston, Northern Territory.

Though we in Australia can, I think, pride ourselves on being up to date in most matters connected with the various branches of our profession, there is one branch of science in which we are likely to be behindhand unless some steps are taken, and that is in the investigation and instruction of those diseases peculiar to tropical life and climate.

During recent years, one of the most striking features in medical matters has been the attention bestowed in England upon the branch of science known as Tropical Medicine. We are all of us aware of Dr. Bancroft's labours and discoveries with regard to filaria, and following upon the investigations of Dr. Manson, Surgeon-Major Ross, and others, in the germ-origin of malaria, with proof of its infection by means of certain kinds of mosquitoes, the attention of scientists was directed towards diseases peculiar to tropical life. It was pointed out that a very large percentage of medical men, after qualifying, found themselves engaged in the military, naval, colonial, or Indian services, or as private practitioners in the tropics, combating diseases in which they had received little or no instruction during their student days. Knowledge, of course, came with experience; but probably in the interim many lives had been lost which might have been saved had such knowledge been gained in the lecture rooms and hospitals instead of in the field. As a result of these representations, schools of tropical medicine were formed and opened in London and Liverpool, and it is probable that in the not far-distant future the examinations for the army, navy, Indian, and colonial services will include papers on Tropical Medicine.

The valuable work consequent upon the establishment of these institutions is only just beginning. Commissions have from time to time been sent out to investigate the causes of such diseases as malaria, plague, and yellow fever; and there is no doubt that, with a fuller knowledge of the cause, better means for the prevention and cure of these diseases will be evolved, with a marked diminution of mortality. It may probably be urged that there is little or no need for education in tropical diseases in Australia, as so little is heard of the subject; but it does not follow on that account that the need for it does not exist. I would point out that, taking the Tropic of Capricorn as the dividing line, more than one-third of the Continent of Australia lies within the Tropics, and its people are as subject to many of the diseases peculiar to the Tropics as the inhabitants of any other country lying in the same latitude. It is true that at present a large portion of this area is waste and unoccupied land, but even now there are within the Tropical Zone such large centres of population as Rockhampton, Townsville, Cooktown, Cairns, Chillagoe, and Charters Towers, not to mention many smaller towns and settlements in the vast districts of North Queensland, Northern Territory, New Guinea, and Western Australia, while Brisbane, and in fact the whole of Southern Queensland, is only just over the border-line.

We have already seen such diseases as malaria, dysentery, chronic enteritis, ankylostomiasis, beri-beri, filariasis, leprosy, dengue, plague, cerebro-spinal fever, and others present in an endemic or epidemic form, and there is no doubt that, as population increases and more rapid communication is established, some at least of these will be liable to extend southward, and we will be subject to other diseases which will be introduced from other countries. Thousands of our men have gone to South Africa, and are returning;

already we find in one of them the presence of the Bilharzial parasite—*Australian Medical Gazette*, September, 1901—and is it improbable that it is present in others as well, and that other diseases will be introduced which, though common in South Africa, are as yet unknown in Australia? Are we not in daily communication with India, China, the Pacific Isles, and other countries in the Tropics from which disease may be introduced?—and in connection with this subject I would mention the case of Mauritius, which at one time was absolutely free from malaria, but which now, owing probably to the accidental introduction of the eggs of the malaria-breeding mosquito, or the mosquito itself, is endemically malarial. As Mauritius was infected from without, so may at any time our Southern States be, from tropical Australia or from foreign parts; and those diseases peculiar to the tropical world may be introduced by passengers or cargo arriving from those parts.

Let us review the experiences of Australia in late years. The outbreak of plague in 1899 is still fresh in the minds of most of us, with its accompanying scare, and we still remember how, on its onset, considerable doubt was manifested as to the real nature of the disease. In 1900 a steamer arrived in Melbourne in which beri-beri had broken out amongst the crew, and nine deaths had occurred. So little was known in Australia on the subject at the time, that advice had to be obtained from the East as to its causation, prevention, and treatment. Ankylostomiasis has from time to time been reported from Queensland, probably introduced from the Pacific Islands. We also see in Queensland that filariasis is endemic in certain districts. Leprosy is occasionally met with both amongst the Europeans and Asiatics, and appears to be endemically present among certain tribes of aborigines in our northern parts. In 1901 we in the Northern Territory were visited by an epidemic of amœbic dysentery, which might very easily have been carried south. Malaria is already endemic over a large area, and may at any time extend, and it is almost certain to become more pronounced on further settlement in the Tropical Zone. There is present in Northern Australia what is probably a fourth venereal disease, described by Manson as "ulcerating granuloma of the pudenda." Dengue is another disease which has been experienced in Northern Australia; while siriasis and allied diseases are always liable to occur, even in our southernmost parts. We hear lately of an outbreak of epidemic cerebro-spinal fever in South Australia; while in our northern parts pemphigus contagiosus and other parasitic diseases of the skin and alimentary canal are present in great variety, and some of them are probably undescribed.

This list could be lengthened, but the above examples will, I think, be sufficient to point out the number of diseases which a professional man living in Tropical Australia may be called upon to diagnose and treat, and for which our present system of training is inadequate; in fact, many of these diseases are untouched in the ordinary medical course. With Tropical Medicine recognised as a separate branch, we would be assured that a young graduate could go forth fully equipped in knowledge to successfully carry on a practice anywhere.

The school, if formed, could be not only educational, but scientific, and could supplement its teaching by investigations in the northern parts of our Continent, New Guinea, and the Islands, where no dearth of subjects would be found, the systematic study of which would be of incalculable value, not only to the scientific world, but to mankind in general.

The recognition of the importance of the subject at Congress by granting it a sub-section to itself would be, at any rate, a first step towards the formation in Australia of a Tropical Board or School of Medicine, which could act in conjunction with other tropical schools elsewhere in the advancement of this most important branch of our profession.

TROPICAL DYSENTERY: ITS PATHOLOGY.

BY

T. Goldsmith, M.B., B.Ch.

It is conceded generally by writers on tropical medicine that the term "dysentery," which is applied indiscriminately to the set of symptoms associated with inflammation of the colon, includes not one, but several diseases due to several pathological causes. In referring to tropical dysentry, I allude to that type in which the amœba dysenterica is present in the stools, and which is liable to be followed by what is known as "tropical abscess of the liver."

In the early months of 1901 the town and district of Palmerston were visited by a severe epidemic of dysentery, during which an examination of the stools in a large proportion of cases showed the presence of the amœba, and it is from the experience gained during this epidemic that I derive my accompanying notes.

I was absent on leave at the onset of the outbreak, but it appears to have broken out almost simultaneously in several parts of the town, following by a few days the first heavy rains after an unusually prolonged dry season. Coincident with the outbreak was a plague of flies, and though I do not wish to infer that they are responsible for the outbreak, I think, with Sir William McGregor—English Congress, 1900—that they play an important part in the spread of the disease when once it has appeared. They cluster thickly round the stools, and by flying thence and drowning themselves in the milk, and walking over other food, they no doubt therein implant the germs of disease, spreading it from person to person, and from house to house. I may here state, that in this epidemic where the flies were thickest, there the disease was most prevalent.

Incubation.—There appears to be an irregular period of incubation, and where several members of a family have contracted the disease in succession, the infection being probably conveyed from one to another, or the inmates of an adjoining house have contracted the disease, the usual interval appears to be from five to nine days.

Pathology.—The disease may vary from a few patches of inflammation or ulceration about the sigmoid flexure to the complete destruction of the whole of the mucous membrane of the large intestine. In one case in which I performed a *post-mortem* examination the large intestine was one huge ulcer from the rectum to the cæcum, the only mucous membrane being utterly destroyed, with the exception of a few patches of acutely inflamed tissue. Covering this, to a certain extent, was a film of lymph, and bands of similar material extended from side to side in the bowel.

The stools of this type of dysentery are very characteristic. During the height of the attack they consist wholly of blobs of greenish mucous, generally streaked or spotted with blood, the smell being sickly rather than fæculent.

A microscopic examination of a portion of this greenish mucous will show—(1) mucous or lymph cells; (2) amœbæ in various stages of development; (3) rounded greenish bodies about the size of red corpuscles; (4) red blood corpuscles.

The mucous or lymph cells are generally seen in masses more or less evenly distributed over the field, with intervals of clear spaces between the cell masses. The amœba, when full grown, is several times the diameter of a red blood corpuscle; when quiescent it is more or less rounded in shape; and when in active movement becomes elongated, and may be described as irregularly oval. It consists of an ectosarc, which is well-defined and clear, and an

endorsarc, which is transparent and colourless, or has a very faint tinge of green; it contains a nucleus, with one or more nucleoli-granules, vacuoles, and greenish bodies, which have been described as red corpuscles that appear to have undergone digestive liquefaction, but which appear to be identical with similar bodies occurring outside the amœbæ. The amœba moves by protruding rounded pseudopodia of clear ectosarc, sometimes to the extent of one-fourth of its own diameter, then there is a rush of the contents of the endosarc towards and into the clear protruded part, and the whole of the after-part of the amœba gathers itself in the direction of the protruded part, locomotion to the extent of the protrusion is accomplished, and the process is repeated. Red blood corpuscles are seen singly or in rouleaux, and are mostly found in the clear spaces between the cell masses; they are little altered in appearance, and in malarial patients the malarial parasite can often be observed in their substance. The greenish bodies referred to are similar to those observed in the substance of the amœba itself; they are usually to be found embedded among the mucous cells or along the edge of the cell masses. They differ from red blood corpuscles in several respects:—

(1) They are always seen singly, and never in rouleaux.
(2) Though about the same size as the red corpuscle, they vary in size more than the red corpuscle does.
(3) They vary in shape more than a red corpuscle does; of course, the latter varies if subject to pressure, but in the examination of fresh stools no pressure is usually exerted, so that their shape is generally normal, while the greenish bodies are often more or less oval.
(4) Their colour is distinct from that of a red corpuscle, being less red, and of a more decidedly green tint.
(5) Their capsule is more distinct, and often a faint suggestion of a nucleus can be seen.
(6) A side-view shows a flat or bi-convex shape, instead of the bi-concave shape of the red corpuscle.
(7) The locality in the field in which they are found is different, they being most frequent within, or at the edges of, the cell masses, the red corpuscles being nearly always found in the clear spaces between the masses.
(8) They are to be observed in the substance of amœba, and free in the contents of tropical liver abscesses, where red corpuscles are not, as a rule, in evidence.
(9) They appear to possess slight amœbic movement, which, of course, the red corpuscle does not.

Their identity being apparently the same as the greenish bodies found within the substance of the amœba, I have come to the conclusion that the view held that they are red corpuscles that have undergone digestive changes is wrong, and that they are in reality embryonic amœbæ. Regarding them as embryonic amœbæ, the question arises, "Are they *de novo* the product of the amœba, or were they originally red corpuscles that have been taken up by the amœba, the germ of reproduction implanted by the amœba, and then discharged again?" For my part, I incline to the belief that they are altogether the product of the amœba, on the following grounds:—

(1) Though careful watching of amœbæ showed me occasionally the shedding of a greenish body, in no case have I seen a red corpuscle actually taken up into the substance of the parasite.
(2) These greenish bodies are present in the amœbæ and discharge of tropical abscess of the liver for several days after operation where red blood corpuscles are not in evidence.

Furthermore, as proof of its relation to the amœba, the various stages of development into that body may be traced. It enlarges, and at the same time loses, to a great extent its distinctive greenish tinge, and the nucleus becomes more distinct; at this period it is almost indistinguishable from the surrounding lymph or mucous cells; it enlarges further, granules, and later on vacuoles appear, but it remains quiescent till more than twice the diameter of a red corpuscle, when the characteristic amæboid movements begin, and it can then be distinguished easily; but it is not till it is full-grown that the greenish bodies appear in its substance, and these vary from one to five or six in number.

It is necessary for me to be emphatic in pointing out the relationship between these greenish bodies and the amœba, as up to the present—as far as I can gather—no satisfactory explanation has been given as to the life-cycle of the amœba from 24 hours after being passed, when it disappears entirely from the stools, to the time when it causes disease by its presence in another host.

Assuming that the amœba be the pathological cause of tropical dysentery, and without entering into the question as to whether it can be evolved *de novo* from fæcal matter, it is undoubted that it is most frequently spread by pollution of drinking-water by fæcal contamination, dysenteric or otherwise: Observers agree that the amœba disappears entirely from the stools within 24 hours of being passed; that is my own experience too, but I find the greenish bodies persist for days. The amœba being practically non-existent 24 hours after being passed, precludes the likelihood that it, in the form of the amœba, is the cause of the disease, and I think there is no doubt that the greenish body that probably persists for months is a latent source of infection, and under favourable circumstances—such as being swallowed, and finding a lodgment in an imbrasion in the mucous membrane of the large intestine—develops into the amœba proper, forms a focus of infection, and by reproduction of its species brings on an attack of the disease.

Ulcerating Granuloma of the Pudenda.

ULCERATING PANULOMA OF THE PUDENDA.

BY

G. V. White, M.B. (Melb.),

Torres Strait Hospital, Thursday Island.

Loui Runza, Maylata, S.S.I., about 26 years of age. Ill about three years. Lived for two months with a woman, on Maylata, who had ulceration of the pudenda. This was almost certainly the source of infection. The disease started with a small sore on the penis, near the corona of the glands, and thence spread completely over the penis on all its aspects, then over the grains in such a way as to resemble the spread wings of an eagle in shape. This resemblance being further borne out by a portion of healthy skin, dipping down between the two wings, exactly over the centre of the *os pubes*. Neither the scrotum nor the skin of the thighs were involved when I first saw him in the Torres Strait Hospital 12 months ago, nor have they been since.

When first seen, the condition was as herewith described:—The glans penis appears as a knob, smooth, moist, glistening bright red in colour, with a tendency to bleed easily on pressure; the top is ulcerated away, the natural shape of the penis being lost, and the urethral orifice is very indistinct; the ulceration spreads all around the penis to the butt, but the scrotum is unaffected. From the butt of the penis the ulceration spreads in the wing-shaped form towards the anterior superior spines of the iliac bones, the granulations projecting fully a quarter of an inch above the surrounding skin in most parts, and overhanging it.

Besides this ulceration is present in an oblong ulcerative patch of exactly the same description on the skin of the right sub-maxillary region, beginning almost at the middle line of the neck and spreading up towards the angle of the jaw, running along the lower margin of the jaw-bone, and being about one and a half inches across. This, the patient stated, had been present for about one year.

The general characteristics of these separate ulcerations are the same, œdematous granular masses, continually exuding a sero-sanguineous fluid, prone to bleed even on removing the dressings.

The patient complains of no pain, only of the inconvenience in getting about, owing no doubt to the inelastic condition of the part. There is no involvement of the lymphatic system, and no prejudicial effect upon the general health.

Twelve months after the above notes were taken, the condition of the ulcerations is:—The penis, except the glans, seems inclined to heal, the granulations having been mostly replaced by scar tissue of a pinkish colour, which, however, tends to break down and scab over; the left side of the grain has almost completely healed over, the granulation having been replaced by scar tissue, from which, in several places, hair has continued to grow, and has already attained a length of more than half an inch. However, there are small islands of ulcerative tissue in two places; the right side has not progressed, and shows hardly any difference. There is an ulceration on the skin of the left sub-maxillary region, almost symmetrical with that on the right, which, by the way, has advanced over the angle of the jaw on to the face; between these ulcerations is a narrow strip of apparently healthy skin.

There are also granular ulcerations, presumably of the same nature, but in which the granulations have been distinctly smaller and less crowded together, running along the buccal aspects of both the upper and the lower lips; these latter have only appeared quite recently.

For three or four months this patient was treated with doses of potas. iodide, gradually increased up to 30 grains three times a day, without the slightest apparent effect, the ulcerations in the meantime being kept as surgically clean as possible. For the past seven months, however, internal treatment has been given up, and the patient has been dressing the ulcerations himself with the ung. hydrarg. ammon. (B.P.).

This case is interesting, perhaps, on account of the apparent auto-infection that has occurred; and also on account of the symmetrical nature of the disease, as noticed in the pudenda, being observed in the neck and on the lips inside the mouth.

A FEW CONCLUSIONS ARRIVED AT CONSEQUENT UPON THE TREATMENT OF OVER 200 CASES OF BERI-BERI.

BY

G. V. White, M.B., B.S. (Melb.),

Torres Strait Hospital, Thursday Island.

In the great majority of my cases this disease has been complicated by a scorbutic condition, which manifests itself mostly by affection of the gums, and in some few cases by a scorbutic condition existing at the junction between the cartilages and bone of the ribs, which in life gives a sensation of dislocation, and after death (according to Dr. Dassell, Gov. M.O. of Thursday Island) shows the following condition:—a spindle-shaped bluish swelling, stripping up both periosteum and perichrondium of the rib, which, on being opened, displays a collection of bloody *débris* in which the ends of the bone and the cartilage are perfectly free and eroded.

Causation.—This is apparently obscure. Patrick Manson says it is undoubtedly a germ disease, but the form, he thinks, does not live as a parasite in the human body, or that it exercises its pathogenic powers in a direct way, or that it passes directly from one human being to another like the germ of the ordinary or directly communicable diseases; medical men, nurses, &c., in hospitals containing perhaps hundreds of cases do not catch the disease. I can say that no case has ever arisen in the hospital here, nor in any part of Thursday Island, although we have had as many as 30 cases in hospital at one time, and though I have tried hard to discover evidences of contagion outside in the fishing boats, I have discovered nothing conclusive. Other Eastern surgeons put the causation as over-crowding, especially in damp districts, low living, exclusive fish diet; and the surgeons of the Japanese Navy favour the nitrogen starvation theory. Certainly, the Japanese have managed to totally eradicate the disease from the personnel of their navy, by regulating the diet upon this theory. Patrick Manson, in his work on "Tropical Diseases," deals fully with all the theories of the causation. I cannot help thinking myself, that it is a dietetic disease due to some poison in the food consumed by the sufferer. Fishing for pearl-shell in Torres Strait is carried out under two separate systems, one being known as "the floating station," under which 15 to 17 boats, each carrying six or seven men, work from a schooner, taking their supplies from the schooner, and depositing their catch thereon, and these men may not get ashore for months, and in many cases for one or two years. They are fed exclusively upon rice, tinned meat, salt beef, and flour, a little sugar, tea, curry-powder, pickles, &c., being added, none but the white men employed on the schooner ever seeing fresh food. The other system is known as "the shore station," under which the boats (which, in most instances, are as well equipped in every way as under the other system) take their supplies from shore, and bring their catch to the island. The longest time such boats would be at sea is three months. As the disease under consideration is almost totally absent from the boats worked upon "the shore station" system, I think it may be safely concluded that the disease is a dietetic one, and in its ætiology closely allied to scurvy.

As is well known, the disease bears a striking analogy in many of its phases to alcoholic neuritis, the chief differences being that in alcoholic neuritis one sees more neuritis and less cardiac trouble than in beri-beri; and (at any rate, in the cases seen here) it also bears some analogy to chronic arsenical poisoning, for the gum complication seen here is generally very

severe in its effects, often going on to alveolar necrosis, with loss of many teeth and sloughing of much tissue. In this causation I may state that the suspicion has occurred to me that arsenic may possibly play a part in the causation of beri-beri, as it has been ascertained that rice is apt to be adulterated by arsenic accidentally, it being a favourite rat-poison in Eastern countries. However, this is a point which I am about to investigate, and which I hope soon to clear up.

In beri-beri the neuritis is often confined to one limb, or even a portion of one limb; this is, of course, only observed in the mildest cases. The lower extremities are affected in by far the great majority of cases. In this description, of course, you will find, if the case be seen early enough, some dropsy in the part affected, not like renal or cardiac dropsy, but merely of the part affected. In severer cases you will find both limbs affected, but not often the four; uncommonly you may find one leg (perhaps the left) and one arm (perhaps the right) affected. The lower extremity is mostly affected below the knee; the upper, below the elbow.

There is always exquisite tenderness over the muscles affected, with more or less paralysis, which is not often complete. I have never seen the paralysis complete as one sees in a lesion of the cord. Knee-jerk is exaggerated in the earlier stages of the disease, but is lost when the case is more advanced. There is great muscular atrophy in all cases, but it is concealed in the earlier stages by the dropsy, and is only observed when the latter disappears. The muscles of the jaw, face, and pharynx are rarely affected, but in severe cardiac cases there is some difficulty of speech. The patient can always control the bladder and the bowels.

In all but the mildest cases you will find some affection of the heart, as shown by a diffuse apex-beat, with some increased area of cardiac dulness due to pericardial effusion, reduplication of the second sound, and often a kind of jumpy irregularity. In the severest cases you will find great increase of cardiac dulness, and loud systolic bruits, great præcordial distress, rapid, irregular heart-action, and difficulty of breathing. In fatal cases large pericardial effusions are found (in one case Dr. Wassell found 12 ozs.), both sides of the heart flabby and dilated, containing a large quantity of *ante mortem* clot. In some cases where there has been great dropsy, you will also find pleural and pericardial effusions, and the muscles and sub-cutaneous tissues saturated with serum.

A typical dropsical case at first sight might be taken for acute nephritis, even after looking at the urine, which may be scanty and high-coloured, with high sp. grav., but it will be found to contain little or no albumen. Another point of difference is that the scrotum and penis are never involved in the general dropsy, and the œdema has a harder feel. The symptoms just enumerated, with regard to reflexes hyperæsthesia, &c., will be found on examination to be present in a marked degree.

But the commonest class of case is the mixed paraplegic and dropsical. This class of case I have already described.

The severity of the attack varies according to the variety of the case; some may never be confined to their beds, and may not experience any difficulty of breathing; others you see almost paralysed, unable to stand unaided, and sometimes unable to feed themselves. Some are terribly swollen with dropsy; others wasted away almost to a skeleton.

Osler attempts to classify beri-beri under four heads:—

1. The incomplete or rudimentary form.
2. The atrophic form.
3. The wet or dropsical form.
4. The acute, pernicious, or cardiac form.

I am of opinion that the classification thus given is completely misleading, as he divides the disease into forms which are really phases of it. It is

common enough to see form 3 merge suddenly into form 4, and if not fatal, gradually pass into form 2; and whereas form 1 represents the greatest number of cases seen, I have on many occasions seen it suddenly advance to form 4, with rapidly fatal results.

Osler's classification is apt to mislead the student into thinking that there are four descriptions of beri-beri.

The prognosis of beri-beri is usually good. Even in those cases where grave cardiac symptoms supervene, free purgation, stimulation, and blistering over the præcordium very often bring about relief. In these cardiac cases death often comes on suddenly, even while the patient is complaining to you of a tightness over the chest. Most cases get well, sometimes after a considerable lapse of time—in some instances months may pass before a paraplegic case is able to walk without the aid of a stick. The ordinary incomplete case, *i.e.*, with merely one or two limbs affected slightly, is always able to walk, and may be well inside of a month with appropriate treatment. The fatal cases here come to rather less than 5 per cent.

The diagnosis is usually simple, especially when seen in epidemics. In isolated cases you should distinguish it easily from cardiac disease by the nervous symptoms, from nephritis by the state of the urine, and from rheumatism by the comparative immunity of the joints, unless the case be complicated by scurvy, when you may have dense swelling of the joints, pain, &c.; but the conditions of the gums in such cases would lead you to the correct diagnosis. However, complaints which may seem like fleeting rheumatic pains should always be carefully considered. I have, on one occasion, sent away a man with a bottle of lin. terebinth co. with which to rub his hips, only to have him sent in the next evening dying of beri-beri, with acute cardiac symptoms.

The treatment followed here is mainly dietetic, rice and starchy foods being excluded, also every article of food that comes out of a tin; fresh meat or meat extracts are given liberally, potatoes and bread are allowed sparingly, fresh vegetables, fruit, and lime-juice are given, fresh milk is excellent, if procurable. Complications are treated as they arise; cardiac distress with brisk purging, blistering over the heart, and liq. strychninæ, strychnine and digitalin hypodermically in urgent cases. I used to think that potas. iodide was useful for the neuritis, but have long discontinued it; and I fancy that 30 grains of compound jalap powder three times weekly has some effect in warding off dangerous cardiac symptoms.

RÖNTGEN RAYS IN THE TREATMENT OF SOME DISEASES OF THE SKIN.

BY

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The credit of first demonstrating the possibility of using X-rays for therapeutic purposes belongs, I believe, to Freund, who undertook, in November, 1896, to remove hair from a nævus on the back. Following him, Schiff of Vienna suggested the use of X-rays for the treatment of various diseases of the hair and of lupus.

Dr. Pussey of Chicago classifies the effects of the rays on the skin and subcutaneous tissues as follows: —

(*a*) Changes in the epidermis itself or its appendages—(1) pigmentation; (2) blanching of the hair; (3) outfall of the hair; (4) trophic changes in the nails similar to those of the hair, sometimes resulting in interference with growth, and in some cases in shedding of the nails.

(*b*) Changes in the corium and subcutaneous tissues. These are all inflammatory in character, varying from slight erythema through all degrees of dermatitis up to necrosis.

I commenced to use the X-rays in July, 1900.

The first case to which the treatment was applied, was a young lady from Queensland, suffering from lupus erythematosis. It had commenced four years ago on the bridge of the nose, and spread to the cheeks, bearing out the resemblance to a butterfly. The eruption was composed of rounded reddened patches raised at the periphery, the central portion of the old patches atrophic, and covered in places with small, firmly adherent scales. On the right side of the nose the scales were thicker and chalky-looking, their white contour contrasting with that of the surrounding parts. The disease had been treated ever since it had appeared, internally by quinine, ichthyol, ergot, tuberculin, &c., locally by all kinds of lotions, ointments, mulls, plasters, oxidised pyrogallic acid in aceton collodion, Fowler's solution, cauterisation, linear scarifications; in fact, every other treatment that has been recommended. Notwithstanding this, there was not much improvement, and the disease was spreading.

On July 10th she was exposed for 4 minutes to the rays from a large, low, vacuum tube attached to a coil giving an 8-inch spark. The skin, other than the affected part, was protected by a lead-foil mask, three to four layers thick, patient sitting 5 inches from the tube. Sittings were given daily, varying from 5 to 10 minutes. On the ninth day it had a sunburnt appearance. The treatment was now discontinued; still the redness increased for four to five days, and slowly subsided. When completely gone, the exposed skin dried into a scaly condition and peeled off, leaving the surface pale, flat, but still a little scaly.

The sittings were now resumed, and continued as before, until a reaction occurred; this having subsided, they were again repeated. In all, she had 27 sittings, occupying 2¼ hours, the last being on the 27th September. The result was nothing short of startling, the skin being smooth, pale, and free from all scales; in fact, normal.

Lupus Erythematosis.
Duration : 40 years.

Lupus Erythematosis.
Duration : 40 years. Exposure : 3¼ hours.

Since then I have treated twelve cases of lupus erythematosis in private practice. Dr. Harris, of the Sydney Hospital, has kindly furnished me with five cases treated there, which I give in detail:—

CASE 1.

Miss D., aged 42, teacher. Affected for 8 months. Well-marked patches over front of nose and on either cheek. Red, raised, and papular in places.

1.8.'00. *1st Sitting.*—Tube at 5 inches distance; rays applied for 10 minutes; tube soft. A mask of six layers of lead-foil employed, with hole cut out corresponding to area required to be acted upon.

2.8.'00. *2nd Sitting.*—10 minutes at 5 inches.

3.8.'00. *3rd Sitting.*—10 minutes at 5 inches.

4.8.'00. *4th Sitting.*—10 minutes at 5 inches. Says the tissues about nose feel looser, and that she can breathe with more ease.

6.8.'00. *5th Sitting.*—4 minutes' exposure. No alteration.

7.8.'00. *6th Sitting.*—Says tissues feel looser still, and that after each application a discharge comes from the back of the nose. No sign of reaction yet. The last twice a piece of gutta-percha tissue was placed over nose. Before this was done she complained of feeling pins and needles in nose, but since, this has disappeared.

8.8.'00. *7th Sitting.*—12 minutes' exposure at 5 inches distance. Tissue on nose for first 8 minutes. Tube at 3 inches, which caused shock. Says that nose and cheeks peeled very readily, and feel looser since. Slightly congested.

9.8.'00. *8th Sitting.*—12 minutes at 5 inches. After a short time felt severe pricking sensation about nose. Gutta-percha tissue put on, and pain disappeared. Reaction appears to be starting. A few red points are visible, and also some slight swelling.

10.8.'00. *9th Sitting.*—15 minutes at 4 inches. The colour is becoming more like that of normal skin. The red points, I think, have been due to scratching. She says her face feels itchy all about the patch. No swelling to-day.

11.8.'00. *10th Sitting.*—15 minutes at 5 inches. Gutta-percha tissue placed on nose after 7 minutes. More natural skin-colour in places. Still itchy. Headache yesterday.

12.8.'00. *11th Sitting.*—15 minutes at 3½ inches. Says it has been desquamating the past few days. Still very itchy. No headache.

14.8.'00. *12th Sitting.*—15 minutes at 3½ inches. Looks better. More of natural skin-colour in places. Still desquamating freely. Itchy. No inflammation yet.

15.8.'00. *13th Sitting.*—10 minutes at 3½ inches. Desquamating more freely. More itchy. Redder to-day. Hazeline ordered as application.

16.8.'00. *14th Sitting.* 15 minutes at 3½ inches. Desquamating well, and redder to-day. The redness extends beyond original area, and is a little diffuse. No tissue employed to cover nose. Hazeline continued.

18.8.'00. *15th Sitting.*—15 minutes at 3½ inches. Looks a little better. Desquamating freely. The more the desquamation the better it looks. Says, when the rays play now upon her nose, that the skin feels tight and pinched. Gutta-percha tissue kept on nose all this time.

19.8.'00. *16th Sitting.*—15 minutes at 3½ inches. About the same condition. Peeling freely.

21.8.'00. *17th Sitting.*—Redness is spreading and increasing; also desquamation.

22.8.'00. *18th Sitting.*—Slight conjunctivitis. Redness increasing in area. More desquamation. Eye-drops ordered.

Ammon. Chlor.	gr. v.
Cocaine Hydrochlor	gr. ii.
Spt. V. Rect.	m. v.
Aq. Camph.	ad. ½ oz.

This sitting lasted for 15 minutes, at a distance of 4 inches, and more foil placed over eyes. This patient attended irregularly. I am not certain of the ultimate results, as she was lost sight of.

Case 2.

A.L., aged 46. Married. Has a patch on the right cheek towards front, size of a shilling. Has been there for many months, and is increasing.

14.9.'00. *1st Sitting.*—Soft tube used at 5 inches, and applied for 10 minutes.

15.9.'00. *2nd Sitting.*—5 inches for 10 minutes.

16.9.'00. *3rd Sitting.*—Reaction of yesterday starting already. Only 5 minutes' application to-day.

17.9.'00. *4th Sitting.*—10 minutes at 5 inches. Redness about the same.

18.9.'00. *5th Sitting.*—10 minutes. No alteration.

19.9.'00. *6th Sitting.*—10 minutes at 5 inches. Redness a little more marked.

20.9.'00. *7th Sitting.*—No signs of desquamation yet.

23.9.'00. *8th Sitting*—Redness increasing in area. Feels it a little itchy. Boracic lanoline ointment ordered, 20 grs. to the oz.

28.9.'00. *9th Sitting.*—10 minutes at 5 inches. Not so red.

29.9.'00. *10th Sitting.*—Redness more prominent. Desquamation starting. A few blood points. Is very itchy.

6.10.'00. *11th Sitting.*—A small scab which had formed has separated, leaving clean, whitish surface. 10 minutes' exposure at 8 inches.

7.10.'00. *12th Sitting.*—10 minutes at 4 inches. Medium vacuum used. Slight redness since last sitting.

9.10.'00. *13th Sitting.*—10 minutes at 4 inches. A little smarting since last sitting. White in appearance, and crinkley.

10.10.'00. *14th Sitting.*—White patch increasing slightly.

18.10.'00. When last seen, skin appeared normal.

Case 3.

Miss X. Suffering from two small patches of lupus erythematosis on the left cheek.

11.10.'00. *1st Sitting.*—10 minutes at 5 inches. Tube soft.

12.10.'00. *2nd Sitting.*—10 minutes at 5 inches.

13.10.'00. *3rd Sitting.*—10 minutes at 5 inches.

14.10.'00. *4th Sitting.*—10 minutes at 5 inches.

16.10.'00. *5th Sitting.*—10 minutes at 5 inches.

17.10.'00. *6th Sitting.*—10 minutes at 5 inches. Slightly red and itchy.

19.10.'00. *7th Sitting.*—10 minutes at 5 inches. Still burning a little.

21.10.'00. *8th Sitting.*—10 minutes at 4 inches. Desquamating. White at periphery. Red in centre.

25.10.'00. *9th Sitting.*—10 minutes at 5 inches. Patches are scaly, and look cleaner.

26.10.'00. *10th Sitting.*—10 minutes at 5 inches. Feels hot. Patches are appearing white, and surrounding tissues red. Desquamating. No further application. All patches had cleared up, and became whitish in appearance and smooth.

Case 4.

M.L., aged 20. Domestic. Small patch 1½ inch in diameter left side of face. Present for 18 months. In appearance is reddish, scaly, and indurated.

15.1.'01. *1st Sitting.*—10 minutes at distance of 5 inches from tube. Hard tube used. In this case a cure was effected without any reaction. After each sitting patient was made to apply boracic lanoline ointment, 20 grains to the ounce.

17.1.'01. *2nd Sitting.*—10 minutes at 5 inches.

23.1.'01. *3rd Sitting.*—10 minutes at 5 inches.

24.1.'01. *4th Sitting.*—10 minutes at 5 inches.

25.1.'01. *5th Sitting.*—10 minutes at 5 inches.

29.1.'01. *6th Sitting.*—10 minutes at 5 inches.

30.1.'01. *7th Sitting.*—10 minutes at 5 inches.

1.2.'01. *8th Sitting.*—10 minutes at 5 inches.

The cure in this case resulted after 8 applications. At the end of this period, the patch became of normal colour, was smooth, and scarcely could be noticed.

Case 5.

26.9.'01. Captain P., aged 75. This patient had a patch near the right orbit, about the size of half-a-crown. Had been there for 6 years. On two occasions was scraped, without any apparent benefit. Various kinds of ointments used were of no avail. Patch gradually increased, and much pain was produced of a neuralgic nature.

When seen at this Department the patch was the size of above-mentioned, scaly in parts, and desquamating, with one or two points where cicatrization was progressing. Near the orbit, the skin was infiltrated. Many comedones were present. In his case a hard tube was also employed, with exposures of 10 minutes at distances of 5 inches, the precaution taken for patient to employ boracic lanoline ointment after each sitting. If the least sign of redness was observed, the application was stopped for several days. At no time had the patient more than five consecutive sittings. More time was employed in this case of effecting a cure, but the result proved the wisdom of slow treatment, as the result was almost perfect. The sittings began 26.9.'01, and were left off 18.11.'01.

Altogether, there were 22 exposures spread out over this time, and when ended, the patches were perfectly smooth, pale pinkish-white in colour, the redness had disappeared, and one could scarcely notice any difference in the surrounding skin. On several occasions the patient complained of an itching sensation in the eye on that side, and the eye-drops were prescribed, with beneficial results.

Six weeks after treatment had ceased, the patient paid me a visit, and it was difficult to see where the original patch had been.

According to these two last results, I consider it better to use a hard tube, not to expose for more than 10 minutes at a time, nor too frequently. I do not consider it necessary for a reaction to be produced in order to effect a cure.

I will not waste time in giving you the tales of my own cases, but show some photographs, which will give a good idea of the results. All my cases were cured, with two exceptions.

Miss E., who had patches of *lupus erythematosis* under the eyelids and under the nose. It was winter-time when she underwent the treatment, and

curiously enough, she got chilblains on the "rayed" surface (*lupus pernio*). The skin became a vermilion colour, and extremely painful. In her case the rays seemed to aggravate the condition, and when last seen her face had in no way improved.

Mr. S., who had suffered from *lupus erythematosis* for 11 years, affecting the nose and malar region, had 8 sittings from the 26th December to the 6th January, 1900, and was obliged to return to the country before the treatment was completed. He writes to me the following, dated 17th January, 1901:—"As regards my condition, it is most satisfactory; and although the nose is not cured yet, it is as different as possible from what it was when I last saw you. The whole result is gratifying beyond measure, and I can never feel sufficiently grateful to you for the marvellous results of your treatment."

I have applied this treatment to other diseases of the skin, namely, *lupus vulgaris, hypertrichosis, nœvus flammeus*, keloid, Paget's disease of the nipple, rodent ulcer, and epithelioma, with varying results.

Lupus Vulgaris.—Fortunately for us in New South Wales, this disease is very rare. Since I have been in practice, 5 cases which developed in the Colony came under my observation. Three of these were submitted to this treatment for a considerable time without deriving any marked benefit, so I abandoned it for Finsen's phototheraphy.

Hypertrichosis.—A number of cases have been reported where the result has been permanent and satisfactory. Notably, Wood's cases, in the *Lancet*, 27th Jan., 1900. Treatment was undertaken in order to remove a profuse growth of down and large hairs from the chin. It remained 8 months after cessation of the treatment "free from down and hair." I employed it in five patients similarly affected. After the 8th of 10 sittings, the hair commenced to fall, and finally the surface became bald. The after-treatment consisted in 3 to 5 short sittings, held at intervals of four to eight weeks, as recommended by Schiff. Still the hair returned. One of our electricians informs me that the backs of his hands, which are very hairy, are being constantly exposed to the rays, and have been denuded of the hair half a dozen times, and still it returns with its former vigour.

My opinion is that it is not a satisfactory way of treating this condition, and is apt to lead to disappointment.

Nœvus Flammeus (or port wine stain).—Jutassey (in *Wien Klien Rund*, 12, 1900) reports to have cured this condition. He gave 14 hours' exposure at 10 sittings.

I tried it on a girl aged 17, with a large patch on her cheek. She had in all 55 minutes' exposure. It had no effect on the condition, beyond producing a deep pigmentation at the periphery, which gradually became absorbed.

Keloid.—Miss S. was suffering from keloid on the arms, chest, and neck, following acne. When she came first under treatment the lesions were very prominent, and of a bright-red colour. She has been under treatment from 30th November to 2nd April, having in all 4 hours' exposure on the arm, and 5 hours on the face. The beneficial effects are apparent. The tumours are flatter, softer, and their growth and vascularity considerably diminished. The photograph gives a fair idea of the result.

A case of Pagget's disease of the nipple was treated from the 26th Feb. to 3rd May. The exposure occupied 6 hours 15 minutes. No benefit was derived.

During the last month I have been applying the rays to rodent ulcer and epithelioma. So far I have only treated cases which have been considered unsuitable for operation, or in which the patients have refused operative measures. At present it is premature to speak of the results.

Case of Keloid.

Case of Keloid.
Exposure : 5 hours.

Case of Keloid.

Case of Keloid.
Exposure : 4 hours.

Skin Lesions produced by the X Rays.—The productions of skin lesions are very common, and several points should be borne in mind:—(1) The strength of the current; (2) distance of the tube from the patient; (3) number and duration of exposure.

It is well to bear in mind the possibility of idiosyncrasy. Some people, as we all know, burn more readily to the sun's rays than others. The cutaneous phenomena may vary greatly. An evanescent hyperæmia or erythema is the most common; but the process may go further, and cause intense redness, swelling, bullae, and even destruction of the tissues, a condition which occurred in a patient of mine, Mrs. P., who was suffering from extensive lupus vulgaris of the nose, and mucous membrane of the mouth. She had 10 sittings in all, of 5 to 10 minutes' duration. The skin exposed became a sloughing sore, giving rise to much pain and discomfort for three months, and had to be grafted before it could be induced to heal.

Marked pigmentation frequently occurs round the zone of exposure, which, after a short time, generally becomes absorbed. An interesting and important feature in connection with the inflammatory and necrotic changes in the skin by the X rays is the fact that these manifestations may be delayed, and oly reveal themselves some days after exposure.

Wylie, in the B.M.J., 9th Feb., 1891, reports the following case, illustrated thus:—"A patient came to him saying that her brother had experimented on her with the X rays, to find out the proper exposure to give for an injury to the hip. The first day he gave her an exposure of 1 hour in the morning, and 50 minutes in the afternoon; and next day 40 minutes in the morning. Three weeks after this she felt a burning pain over the lower part of the abdomen and upper part of her right thigh, with a redness over an area of 6 inches. This terminated in a superficial ulcer. Little islands formed over the ulcerated surface, joining together, and healed up in 6 weeks under carbolic-oil dressing."

In concluding, Dr. Pussy, of Chicago, points out—"The great point in treating diseases of the skin by the rays is not to overstep the limits of safety. Its aim is to produce a slight degree of inflammation, and to so regulate the exposure to hold the irritation at this stage."

A CASE OF SKIN DISEASE.

BY

DR. HARDY.

I BRING before you a case of skin disease, which has been for years a source of perplexity to me and anxiety to the patient herself. I have presented her to many medical men, not only from this, but from other Colonies, and the diagnosis, and especially the treatment, has been unsatisfactory. The diagnosis especially has varied, having never been diagnosed twice in succession as the same disease. Some called it syphilis; another said it was tubercular; several eczema; one called it *lichen verrucosus*. The patient is anxious to take this opportunity of appearing before the Congress, to get, if possible, a definite and authoritative opinion on her disease.

A.D., aged 37 years. Is single and of healthy appearance, although she has always suffered severely from dyspepsia. Her father, aged 72, and her mother, 63, are both alive and well. Of 13 of the family, 10 are still alive; whilst 1 died in infancy of measles, and another at the age of 29, suddenly, whilst recovering from influenza. A sister died suddenly at 39; but the cause of her death seems to be a matter of doubt; it is certain, however, that she is asthmatic. The patient, herself, has always lived in Hobart till nine years ago, when she went to Sydney, where she remained for four years. She was always healthy until about 17 years of age. The catamenia appeared at 15, were regular till 17½, when they suddenly ceased. She took some medicine, and on their re-appearance some six months after, this rash first showed itself. It began upon the arms, then appeared upon the wrists, and gradually spread all over the other limbs; it then was observed about the ankles and feet, spread upwards to the knees, then along the thighs and lower portion of her body, and now it is appearing on the upper part of trunk, back, front, and on the sides; it is slightly developed on palms, soles, and face. The lower limbs are more extensively involved than the upper, and the lower portion of the trunk than the upper part. It is worst on the inside of the thighs and knees. The mucous membranes seem to be spared. The eruption, as a whole, is markedly symmetrical, and most pruritic. It is usually worse in cold weather, but any sudden alternation of temperature will always determine it. The lesions themselves, when fully developed, are hemispherical in shape, of about the size of a split-pea, or larger; they become pigmented from dark brown to black. They start, as the patient herself describes, like a mosquito-bite, whitish and red at the edges, and are preceded and accompanied by severe itching and tingling. They come out in crops every few days, are rapidly evolved, and may rapidly disappear; most of them remain as pigmented spots, flare up from time to time, and gradually become large, and as it would appear, permanent. Some of the large papules involute and leave white-like scars. Friction will always enlarge any apparently quiescent lesion.

With regard to treatment, I may say, that in case it should have been syphilitic, I administered mercury and iodide of potassium, but without any evident effect; arsenic and quinine have been the drugs I have chiefly relied on; but nothing seems to have been of much avail. Since she suffered from dyspepsia, I have been careful to attend to her diet and regulate her bowels. Locally, I have applied lotions and ointments, more especially of the anti-pruritic type, preparations of zinc calamine, and more especially, tar.

DISCUSSION.

DR. F. A. BENNET (Sydney) said—" I rise to compliment Dr. Hardy on the interest he has taken in this case, and to thank him for the opportunity he has afforded us of seeing and examining an eruption so interesting and extraordinary, and withal, so puzzling and perplexing in its nature. I

heartily sympathise with Dr. Hardy's friends who were called upon suddenly to face the diagnosis of such a case as this is, for a more aberrant or recalcitrant complaint one is seldom called upon to treat, or put a name upon.

With regard to the various diagnoses that have already been mentioned, I would say that it seems reasonable to ask whether this affection is not syphilitic in origin?—but the time taken in the evolution of the disease, the length of time during which the lesions have remained *in statu quo*, the pruritus, the absence of any history of local infection, or of further manifestation of syphilis, are sufficient, in my mind, rapidly to dispose of such an idea.

The man who termed this eruption tubercular, would no doubt simply have meant to classify the lesions only, and since that was equivalent to saying that the eruption was a nodular one, he was right as far as he went; but he failed to throw any light on the real nature of the complaint.

The diagnosis of eczema need not detain us long. Since this eruption is altogether a dry one—never has evinced any tendency in its inherent stages to vesiculation, or at any stage to weeping—we may safely pass it over. Although it would not be surprising in such a pruritic case that the patient's finger-nails might induce mechanically at any time an eczematous, or rather, ecthymatous, condition.

My sympathies certainly go out to the one who claimed this disease for the lichen group. The age at which it appeared, the sex in which it manifested itself, the symmetry, the pruritus, the parts that were first attacked, the parts to which the disease now chiefly clings—to the limbs rather than the body, and the lower portion of the body rather than the upper—all these fall rapidly into line with such a diagnosis; and if he had farther qualified his diagnosis as lichen *obtusus*—*verrucosus* being manifestly absurd—then the lesions, too, would have accurately corresponded in size and shape, at all events, with this affection.

But yet, I do not think we have to deal here with a lichen. The mode of evolution will not permit us to place it as such. The eruption comes out suddenly, is preceded and accompanied with great itching and tingling, so that the patient has to scratch violently for relief, appears from day-to-day, whilst the lesions, as the patient herself describes them, are exactly like mosquito-bites. We have evidently to deal here with *wheals*, and, therefore, with *urticara*; but not of the ordinary type, for the lesions are symmetrically distributed, remain permant, and pigment. Fortunately, there is a rare form of urticaria into which even these phenomena will fit—*urticaria pigmentosa*. But even from a typical case of this it differs, for *urticaria pigmentosa* usually commences within the first few years of life, and disappears about pubity.

Further, in this patient we have *urticaria factitia* in pronounced degree. Rubbing, too, will cause the apparently quiescent lesions to flare up and enlarge. The sum of this evidence appears to me sufficient to justify a diagnosis of *urticaria pigmentosa* of the nodular form.

As to treatment, if Dr. Hardy has not been pre-eminently successful, it is no fault of his, for he has evidently treated the affection as successfully as any other one under similar conditions could do. No human means have yet been devised satisfactorily to cope with this trouble; and yet, the patient need not be without hope, for there are three well-recognised stages in this affection:—(1) A stage of evolution which may last for some years; (2) a stage during which the lesions may remain more or less stationary, likewise, a matter of years; but bye-and-bye (3) a stage of retrogression sets in, during which the symptoms gradually disappear; and if the retrogressive stage has been delayed here, we must not forget that the eruption was late in making its appearance, and we need not, therefore, be surprised that it should be late in disappearing."

Dr. Herman Lawrence concurred in the diagnosis made by Dr. Bennett.

SECTION OF SURGERY.

AN ADDRESS DELIVERED TO THE SECTION OF SURGERY.

BY

L. E. Barnett, F.R.C.S., President of the Section.

Allow me in the first instance to express to you my gratitude for, and appreciation of, the very distinguished position I occupy this morning. This honour, however, belongs not to me personally, or only so in a very minor degree. I do not claim to have climbed high on the ladder of surgical fame, but to New Zealand has the distinction been paid of selecting the Lecturer on Surgery at the New Zealand Medical School to be the President of the Section of Surgery at this Australasian Congress. For New Zealand I thank you, for myself I thank you, and wish I were more worthy to preside over so brilliant an assembly. I must crave your indulgence for any shortcomings in my address. In it I have simply set down certain matters which have seemed to me important or interesting in connection with advances and limitations not only of surgery, but also of surgeons.

Since the last meeting of Congress at Brisbane we have had occasion to lament the death of Queen Victoria, that most beloved Sovereign under whose beneficent sway Great Britain and her dependencies have progressed so marvellously. Blessed be her name, and may our good King Edward, following her noble example, continue to cherish and foster all that makes for the good of mankind, and in particular the great science and art of healing, the progress of which so strikingly exemplifies the vast strides of modern knowledge. In the Victorian era, surgery, which for me is the subject of special reference to-day, advanced not steadily, but by leaps and bounds. Indeed, I would go so far as to say that in the last fifty years of our late Queen's reign more progress was made in surgery than for a thousand years before—aye, and for ten thousand. In olden times there were epochs in surgery, the epochs, for example, of Hippocrates, of Harvey, of Paré, and of Hunter. Large do these loom down the vista of surgical history, but they shrink into insignificance when compared with those two mighty discoveries of Victoria's reign—anæsthesia and asepsis. We honour the names of the great dead associated with the introduction of anæsthesia—Humphrey Davy, Wells, Morton, Warren and Simpson. They reaped but little benefit from their work. Their lives, indeed, were oft embittered by controversy and abuse; but these were steadfast men, and they have given us the priceless boon of anæsthesia. Lord Lister still lives, honoured by his King, his country, and his colleagues. His ability and his indomitable perseverance have been rewarded; he lives exalted to witness the triumph of his labours. Would that the great French savant, Louis Pasteur, lived also to continue that magnificent work which formed the basis upon which Lister and his compeers have raised the lofty fabric of asepsis. Gentlemen, you have heard and read and perhaps written so much about anæsthesia and asepsis and their incalculable influence on modern surgery that I do not purpose saying anything further about these subjects, except in connection with one or two points that I think are of particular importance at the present time. Firstly, in regard to anæsthesia. I emphatically declare there are still far too many deaths from chloroform, and I believe the reason is that chloroform is far too frequently administered. Ether, as the safer, should be the routine anæsthetic until something safer still is discovered. Chloroform, administered by an expert anæsthetist, is probably safe enough, and is simpler and pleasanter to administer than ether, but expert anæsthetists are few and far between. In many medical schools

the administration of anæsthetics is inefficiently taught, and men go into practice unable to administer anæsthetics properly. Many of them prefer the simplicity of chloroform, but they do not heed sufficiently its dangers. I have a strong impression that deaths from chloroform occur most frequently at the hands of young house surgeons in the public hospitals, and I am convinced that in most hospitals in these colonies, at any rate, the house surgeons give chloroform, and almost always chloroform, and so it still is with the majority of practitioners in private. Oh! the misery of doing a critical operation when the man giving chloroform does not know his business, and is either exasperatingly and dangerously timid, or else extravagantly and dangerously reckless. We tremble for the patient, and we pity the operator. Now I am aware that in a few of the public hospitals, especially those associated with the medical schools, there is an expert anæsthetist appointed to administer and to give instruction in anæsthetics. I am aware also that a considerable number of men understand the administration of ether, and appreciate its safety and other advantages. It requires only a little practice to give ether well. It is far safer than chloroform, and my experience is that it does not make the patient sick for so long afterwards. Ether sickness soon passes off; chloroform sickness sometimes lasts for days, and I have known chloroform sickness to end fatally. Now, to the average man, in spite of certain disadvantages of ether, the cumbrous apparatus, the odious and clinging smell, I make bold to say, learn to give ether, and give it freely and give it often. Follow the lead of America and reserve chloroform for the special cases. Then there will not be so many inquests, and our patients will not have such a dread of going under an anæsthetic. I have been greatly impressed with the dictum of that eminent and outspoken surgeon Sir Mitchell Banks, who says: "Have you ever imagined what would be the effect on all our cases of cancer if every such case were operated upon when the growth was no larger than a pea?" I am convinced that the greatest dread that patients have of submitting to an operation in the early stage of disease is that of death from the chloroform. Remove our patients' very warrantable fear of chloroform, and surgical results would vastly improve by reason of earlier consent to necessary operations being obtained, by the less extensive operations required, and by the better resisting powers of the patients, who so often, under existing conditions, decline the surgeon's proferred help until they themselves are reduced by disease, suffering, and despair to mere bodily wrecks, and the surgical aid to a forlorn hope. I can speak highly of the modern method of giving laughing gas first and then ether. This seems to me the most rapid and satisfactory way of producing anæsthesia for all the ordinary surgical purposes.

The production of local anæsthesia by freezing with ether or keléné, or by the use of cocaine and similar drugs, has of late years obtained a widespread sphere of usefulness. Many surgeons of note, Professor Kocher, of Berne, for example, perform major operations, such as exploratory laparotomies and thyroidectomies, with the aid of cocaine. A truly wonderful step in the evolution of anæsthetics is the injection of cocaine by lumbar puncture into the spinal canal, whereby anæsthesia of the lower half of the body can be produced. Under this form of anæsthesia, known as medullary narcosis, various operations, such as amputations, lithotomies, &c., have been successfully and safely performed. There are risks associated with this procedure, especially from sepsis and syncope, and from puncture of a vein, but so far these disadvantages have not been very evident. Prudent surgeons in the meantime reserve medullary narcosis for cases where general anæsthesia is contra-indicated.

In regard to antiseptic or aseptic technique, the merits and methods of which have been so often discussed, I wish only to say this. We have learned that the more careful and thorough a surgeon is in every detail of antiseptic

technique the better for the patient. We know it does more harm than good to swab and douche healthy living tissues with antiseptic lotions. We know we must, on the one hand, prevent by all possible means the ingress of bacteria into the living tissues, and on the other hand support by all possible means the vitality of the tissues, so that they may resist the attacks of bacteria that cannot be kept out. And we know how difficult it is to do these things. What conscientious attention to detail is essential to success! The technique of asepsis, although admittedly imperfect, has become elaborated to an extraordinary degree, and surgeons worthy of the name take an immensity of trouble to prepare themselves, their patients, their assistants, their instruments, and the whole environment, in order to ensure a successful termination of the case; and so should it be. I maintain that only those who are prepared to take such pains should perform such important operations, and this point I shall refer to again presently.

Bacteriology has in recent times risen from oblivion to a fascinating study of vast dimensions and of immense practical importance. How keen is the quest for new bacteria! Why, there must be a little army of patient investigators in the different laboratories digging and delving amongst diseased tissues, sowing and cultivating the tiny germs; years of work so often fruitless, but every now and again a brilliant discovery is given to the world, at once, with no thought of monetary gain, for the medical scientist never puts a price upon his work. I need only mention as examples such diseased conditions as septic infection, tuberculosis, anthrax, glanders, actinomycosis, diphtheria, tetanus, dysentery, and malignant œdema—all of them proved to be due to specific micro-organisms, to show how valuable has been the aid given by the bacteriologist to the practical surgeon. The true pathology of cancer remains unknown; an infinity of research has been, and is still being, devoted to it. Let us hope that amongst the workers there will soon arise one who will solve for us the problem of cancer, that great and increasing scourge which has baffled the investigations of so many able pathologists.

One of the most brilliant pieces of work in connection with bacteria has been the discovery and use of anti-toxins, which have proved so beneficial in certain diseases, notably diphtheria, the mortality from which has been thereby most materially reduced.

Another advance of undoubted importance, and one intimately related to the subject of bacteriology, is the employment of the Finsen, or blue-light rays, in the treatment of lupus, rodent ulcers, and cutaneous diseases. I am inclined to think there is a great future for the therapeutic employment of certain forms of light in certain diseases, and in this connection I must mention the Röntgen or X-Rays. For although most often used for the localisation of bullets, other metallic foreign bodies, and calculi, or for the diagnosis of bony displacements and thickenings, yet there is a distinct sphere of usefulness for the X-Rays as a therapeutic measure. Cases of lupus and rodent ulcer have been cured by the X-Rays, as numbers of carefully recorded cases testify, and—wondrous paradox!—both baldness and undue hairiness appear equally amenable to the beneficial influence of the X-Rays. Perchance these X-Rays are literally rays of hope for those amongst us afflicted with the microbes of baldheadedness. We shall soon see sanatoria for the treatment of certain diseases by various forms of light—blue light, red light, green light, white light, sunlight, and electric light and Röntgen light. Light as an illuminant also has been by so many devices made more and more useful to the surgeon. One can nowadays with the ophthalmoscope, the laryngoscope, the otoscope, and the cystoscope, so easily inspect the fundus of the eye, the throat, the ear, and the bladder. Even the antrum of Highmore and the interior of the stomach can be to some extent illuminated.

The saline infusion of two or three pints of sterilised salt and water introduced preferably into a vein, but effectual also, though more slowly, when

injected subcutaneously, or even per rectum, is now recognised as of immense value in the treatment of certain contingencies, such as collapse from hæmorrhage, from severe injury, or from prolonged operation, eclampsia, or diabetic coma. I doubt whether the usefulness of this measure in such cases is sufficiently appreciated by the majority of practitioners, but it will save life in many desperate cases, and the very simple materials and appliances necessary should always be in readiness.

Another most useful and life-saving innovation in surgical work is the placing of patients in the Trendelenberg position for certain operations in the lower abdominal and pelvic regions, where the patient's body is tilted obliquely, head downwards, so that the abdominal viscera gravitate towards the diaphragm, and allow a clear view of the deep structures. Only in this way can one deal satisfactorily with such dangerous complications as adhesions to deep-seated veins, ureters, and bowel. Gynæcologists who know the value of this position and of other posural aids to pelvic examinations have made use of Trendelenberg's position for many years. The general surgeon does not employ it often enough. Much of the dangers of blind groping, tearing, plugging, and mass ligaturing could be avoided if the patient were placed, in appropriate cases, such as difficult appendix operations, in the Trendelenberg position.

A distinct advance has been made in the local treatment of hæmorrhage by supra-renal extract. Swabbed over a mucous or raw surface or subcutaneously injected, it has a wonderfully styptic effect, and has proved a great boon to general surgeons and to special workers on the nose, eye, ear, and throat. Great hopes are entertained, too, of its usefulness in those dread cases of hæmophilia which at times have baffled every effort to check bleeding. In this connection, too, might be mentioned the administration of calcium chloride by the mouth, and of gelatine by intravenous injection, with a view to increasing the coagulability of the blood. In the treatment of aneurism a certain measure of success seems to have attended the employment of these remedies.

The mention of gelatine brings to my mind that substance paraffin, which has been of late, in Vienna especially, employed in such an extraordinary manner. The paraffin, so prepared as to melt at a temperature very slightly above body heat, is injected subcutaneously in order to fill up a gap or depression or bodily deficiency. When injected it solidifies, but can still be moulded in any desired way. Thus fistulous openings have been closed, and bridgeless or saddle-shaped noses are raised while you wait to Grecian or even Roman contour. You can see there are great possibilities for paraffin in plastic surgery, but there is a dangerous element to be reckoned with: to wit, thrombosis in the veins, and possibly embolism.

The mention of plastic surgery leads me to speak in terms of unstinted praise of Thiersch's method of skin-grafting, whereby raw surfaces, large or small, new-made or old, can be speedily and permanently covered by epithelium, with but little subsequent contraction of the scar. In many cases of huge ulcers left by burns or scalds or sloughing processes, and in cases of very extensive operations for cancer of the breast, Thiersch's method of skin-grafting is invaluable.

Advances into regions and against diseases previously sacred to the physician have been characteristic of latter-day surgery. The old Sanskrit aphorism remains true: "Medicine without surgery is as a bird with but one wing"—though I am bound to admit that the surgical wing of that symbolic bird has become hypertrophied to a very noticeable degree.

Professor Jamieson, in his philosophic and altogether admirable address of yesterday, did condescend to genial banter on the poaching of the surgeon on what the physician hitherto believed were his rightful preserves, which preserves he grimly notes are year by year getting smaller and beautifully

less. But he must, and all physicians must, submit to the inevitable. Wherever medicine alone has shown itself powerless for good, surgery is summoned to its aid. In a spirit of true scientific enquiry in most cases urged by the physician, by the physiologist, and by the pathologist, but with cautious steps, the surgeon explores further and further afield, discovering new possibilities, and giving his experiences to the world. Thus, for example, have evolved the wonders of brain surgery and of abdominal surgery. Think of the terrible gravity of intra-cranial suppuration, mastoid disease, sinus thrombosis, traumatic epilepsy—all of them rescued from the category of hopeless affections by surgical skill. Think, too, of the risks of appendicitis which still claims far too many victims owing to the lack of surgical help in its early stages. Think, too, of the speedy cure that one can bring about in a suitable case of tubercular peritonitis by a timely abdominal section. Think, too, of the utterly hopeless complication of perforation in a gastric or an intestinal ulcer if left only to medicinal treatment. Think, too, of the various affections of the kidney in former times regarded hopeless, such as calculous pyonephrosis and renal tuberculosis, now quite frequently cured by surgery. Think, too, of the terrible afflictions of gallstones, of hydatid disease, and of the numerous classes of internal tumors. What numbers of patients have been rescued from death by modern surgery, and, as an example of the great progress that has been made in abdominal surgery, let me emphasise that invaluable operation which has so deservedly become common—gastro enterostomy—an operation which many men and women now walking about in comparative health and comfort have good reason to be thankful for. In cases of obstinate gastric ulcer, or pyloric obstruction from malignant or simple stricture, gastro-enterostomy properly performed affords immense relief. All these, and I could quote many more, are examples of lesions which, if not speedily cured, are productive of a crippled and miserable existence, and for these the surgery of to-day offers, it may be, absolute cure, or maybe a welcome prolongation of life, with relief of suffering. I could, indeed, multiply examples well nigh indefinitely, the march of surgery has been so triumphant. Failures occur; how could it be otherwise? Tubercular meningitis has thwarted all the efforts of the boldest and most successful operators. In that pitiable condition, micro-cephalic idiocy, the operation of craniectomy, modify and extend it how you will, in 99 cases out of 100 is useless. No doubt the primary mischief is in the defective brain, and not in the defective skull. In exophthalmic goitre the removal of a lobe of the thyroid has been attended with such frightful mortality that most surgeons shrink from attempting anything more than section of the isthmus.

In his advances into new and oft-times dangerous regions the surgeon is sometimes worsted, but the victories far outnumber the defeats, and to the credit of modern surgery stand hundreds of operative procedures established by the experiences of physicians as well as surgeons, as the best and safest remedies for the diseased conditions concerned.

I know, and you know, and the public know, all about that meddlesome operating, that unnecessary operating that has been so justly condemned by Sir Felix Semon and others. We cannot get away from the deplorable fact that there is a discreditable side to modern surgery; that, in other words, there are black sheep in the profession. Operating is regarded by some few of our number—I am glad to say a very few—as merely a highly lucrative craft, and the commercial spirit sometimes obtrudes itself unpleasantly.

How apt are Dryden's words—

> "Interest is the most prevailing cheat,
> The sly seducer of both age and youth;
> They study that and think they study truth,
> Where interest fortifies an argument,
> Weak reason serves to gain the will's assent,
> For souls already warped receive an easy bent."

This evil spirit of self-interest must be exorcised from amongst us. The human body should be held sacred from unwarrantable mutilation, and is so held, I maintain, by the true surgeon, by the surgeon worthy of the name. But, gentlemen, what I fear has been one unsatisfactory result of the brilliant successes and advances of modern surgery is the multiplicity of operators, as well as of operations, and this applies particularly to the Australasian States, where climate or environment or social conditions seem to engender a surprising development of self-confidence.

In these States there are but few men practising Surgery exclusively. A large proportion of operative work is carried on by general practitioners with a leaning towards surgery, men who gain in this way very considerable surgical experience, especially when they hold hospital appointments. But there are general practitioners in the towns as well as in the country who have, by natural aptitude, special study, or by experience, not the remotest claim to surgical reputation, and yet these men recklessly undertake operations of all kinds, and, one hears and reads, with an astonishing amount of success, so that their fellow practitioners, often equally unused to operative work, are fired to emulate these brilliant achievements. But in the books of the recording angel what a black and bulky record is there of bungles, blunders, and incomplete operations, and preventable deaths. Now I hold, and this is the point of my argument, that medical practitioners who undertake to do operations which they hope will be easy, but which may be difficult or hazardous, should have some special knowledge, skill, and experience in operative surgery. In the interest of humanity, and for the credit of our profession, it should be so. An operation given into the hands of a general practitioner, untrained and unused to surgical work, is like a broken bicycle in the hands of a general blacksmith. If the damage is easily repaired all goes well, but if the damage is deep-seated and complicated, woe betide the patient or the bicycle. I do not mean that the general practitioner should never operate, for I maintain that every man who leaves a modern school of medicine with a diploma entitling him to practise must be competent to perform not only all the minor operations, but very many of the major procedures, such as amputation of limbs, ligature of the main arteries, herniotomy, suture of intestines, tracheotomy, excision of the eyeball, iridectomy, &c. In other words, every general practitioner should be ready to undertake cases of imperative surgery, should be equipped with the necessary instruments and appliances, and should understand in all essential details the technique of aseptic surgery.

In these States it falls to the lot of many general practitioners to reach far beyond the limitations of imperative surgery. But I do maintain that any practitioner who aspires to a surgical reputation should pass through what one may call a surgical probation. It is impossible for all such to realise the ideal, but they should aim at securing the highest practicable standard. And what is the ideal? A surgeon should be a man—mark you, a man, not a woman—of certain innate characteristics, quick perception, sound judgment, readiness of resource, *sang froid*, a good eye, and a steady hand. He should by a specially directed education become proficient in drawing, and be skilled in the use of tools. He should devote more than the usual amount of time to the study of anatomy and surgery; he should, and this is of the highest importance, have held a resident appointment in a public hospital. A special degree or qualification in surgery is desirable, though not essential. He should later become a member of the surgical staff of a general hospital. Thus by nature, study, and probationary practical training is the surgeon evolved. It is not too much to expect that the men who operate should, at any rate, approach the standard.

I cannot conclude my address without making some general reference to the war in South Africa, now, we fervently hope, nearing its long-delayed termination—a war waged by Great Britain and her loving and well-loved

colonies against a singularly stubborn and determined foe; a war which has cost so much in men and treasure, and which has been so pitifully prolonged by the hope of foreign intervention, and by the traitorous harangues and intrigues of pro-Boers, some few of them, no doubt, conscientious and peace-loving patriots, but the majority notoriety-hunting scoundrels, who ought to be banished from the shelter of British residence.

Gentlemen, I have neither the presumption nor the inclination to address you on the subject of the medical aspects of the war, concerning which there is already a vast amount of literature at your disposal. The biggest lesson of all, the one that stands out in hideous relief, is the awful mortality, not from wounds, but from disease: from enteric fever, dysentery, and malaria, every one of them, mark you, regarded, in the light of modern knowledge, as preventable diseases. Army sanitarians to the rescue, therefore, in future wars. They are needed more even than the physicians and surgeons, who have done and are doing such noble work.

I would that I could do justice to those loyal hearts, those members of our own profession here in Australia and New Zealand, who have taken an active part in the South African campaign. Brave, self-sacrificing, and devoted workers, they have won and earned a glorious reputation. Some, of course, have done much more than others. Some had grand opportunities, and made the highest use of them; some had poor opportunities; perchance some neglected opportunities they had. I have myself had no means of rightly judging the comparative merits of the numerous band of medical workers, whether of consultant or ordinary rank, who left our Australasian shores; but I do know that collectively they have given us an imperishable record of heroic self-sacrifice, of gallantry under fire, of wounds sustained and disease suffered, of death, of skilful surgery, and of medical organisation surpassing all that has been seen before.

THE CONGENITAL FACTOR IN HERNIA.

BY

R. Hamilton Russell, F.R.C.S. (Eng.),

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(With Illustrations.)

It may perhaps be within your memory that at the last meeting of our Congress at Brisbane, I contributed a paper to the Transactions of this Section entitled "The Etiology and Treatment of Inguinal Hernia in the Young," ([1]) and I placed before you certain important conclusions at which I had arrived in respect of the etiology of inguinal hernia in young children. My operative experience of sixty cases was very small, it is true, when compared with the enormous series that are frequently placed before us by surgeons at the present day; but I would point out that my series was an indiscriminate one, comprising an unbroken record of every case of inguinal hernia that had come into my hands during a certain period, and the evidence afforded by an indiscriminate series of sixty cases when that evidence is unanimous, is more weighty than any evidence that could be deduced from 600 cases that have been selected by reason of certain clinical characters that were deemed to call for operation.

The conclusions at which I arrived, and which I believe to be of fundamental importance for a clear understanding, not merely of inguinal, but of all other forms of abdominal hernia, I will set forth in the following propositions:—

1. Oblique inguinal hernia is invariably caused by the presence of a congenital sac which, in the vast majority of cases, is provided by patency of the whole, or a portion of the processus vaginalis.
2. There is no evidence in favour of the view that congenital weakness of the abdominal wall in the inguinal region is a factor in the causation of inguinal hernia.
3. While actual weakness of the abdominal wall in the inguinal region is frequently met with, and is an occasional cause of recurrence after operation, such weakness is not congenital, but is an acquired weakness due to the existence of the hernia and the use of a truss during a lengthened period.
4. Complete removal of the sac, when performed before the abdominal wall has sustained such damage, will not be followed by recurrence.
5. The causes of recurrence after operation are three in number, viz.: (*a*) The above-mentioned acquired weakness; (*b*) incomplete removal of the sac; (*c*) traumatism, the result of misguided methods of operating.

These, then, are my articles of faith; the arguments on which they are based have been already published very fully, ([2]) and I do not intend to trouble you with them again. The only new argument that I will bring forward to-day, if you will be so courteous as to regard it as an argument, is this: My former series of sixty cases has, in the last two years, been extended to well-nigh double that number, with the result that so far from having observed anything to shake my belief, my confidence in the truth of the

([1]) *Lancet*, November 18, 1899, and *Intercolonial Medical Journal of Australasia*, September 20, 1899.

([2]) *Lancet, loc. cit.*, and November 17, 1900.

foregoing statements has been redoubled. To-day I will ask you, whether you agree with me or not, to assume for a few minutes that my views are correct, for I wish to suggest to you that they apply equally to inguinal hernia in the adult; that there is no difference, etiologically, between the inguinal hernia of children and that of older people, and that the management of the affection in either case will be the same in principle, differing somewhat in detail, but differing only by reason of certain factors that are often imported into the case of the adult, but from which the young child is free.

When hernia has existed for some years, the inguinal canal becomes converted into a large hole in the abdominal wall, because the curved fibres have been stretched, atrophied, and displaced during a period of years, and are quite incapacitated from performing their natural function as the inguinal sphincter. This leads me at once to draw your attention to one of the singular and fundamental errors that have pervaded the whole theory of inguinal hernia. The belief is almost universally held that inguinal hernia is often the result of some congenital weakness of the inguinal abdominal wall, which permits the descent of a rupture. This generally accepted view is the exact converse of that which I believe to be the truth, for instead of the weakness being congenital, and the hernia consequently acquired, it is the hernial sac that is congenital, and the weakness that becomes ultimately acquired. It is of the utmost importance that this fact should be appreciated, for its teaching, when reduced to practice, means that if, on the first occurrence of hernia, the sac be removed, the abdominal wall will thenceforward be unimpaired, and the patient will be no more predisposed to recurrence than he would have been if he had never had a congenital sac, and never had a hernia.

Let me illustrate this point by citing the case of a man, æt. 24, a noted footballer and a blacksmith, who became suddenly ruptured while playing football in August, 1899. At the operation four months later, the bowel was found to have entered one portion of a bilocular congenital sac; the entire sac was ligatured at the neck and removed, after incision of the external oblique aponeurosis, but no attempt was made to close the canal by sutures. The patient was kept in bed a fortnight, told to exercise caution for a month afterwards; after that, he was allowed to return to his arduous work, and to indulge without stint in athletic exercises. For the last two seasons he has been as distinguished in the football field as he was before the operation, and is one of the best forwards in the premier football team of Melbourne. I have quoted this case in order to illustrate a point, which is this—the sac was unquestionably congenital, and was the essential cause of the hernia, no matter what the immediate cause might appear to be, and simple removal of the sac was efficient in curing the hernia absolutely.

We quite discarded any theory as to a local weakness of the abdominal wall, but please to note that the condition that warranted us in discarding that theory was the fact that the hernia had only existed four months; too short a time for any very serious damage to result to the abdominal wall from its presence. But supposing that instead of four months, four years had been allowed to elapse, then we should have had no such confidence, and the precautions against recurrence that we should have had to adopt would have been much greater and more extended in time, for some local weakness of the abdominal wall would certainly have been acquired.

Again, supposing that instead of four months, or four years, he had worn a truss for, say, forty years; at the age of sixty-four there would have been a gaping aperture in the abdominal wall, which would manifest no tendency to close after the sac was removed, we should then close it by Bassini's method, which is by far the best of its kind, in my opinion, but the assurance of success would be much diminished.

Furthermore, I think, were such a case presented to us just now, some of us might receive with incredulity an assertion that the sac was congenital.

Among the children upon whom I have operated, some 115 in number, I know of only two in which there has been anything in the nature of a recurrence. In both these cases the recurrence consisted in a slight yielding of the abdominal wall—the result of the acquired weakness. Both occurred two or three months after the operation, and both were remedied by the use of a light truss for three months. One was a boy, æt. 10, who had worn a truss from infancy, and he brought about the recurrence through attempting some acrobatic feats; the other, a child of five years, fell out of a tree on to his stomach. In cases where a truss has been worn for any length of time, such severe tests as this should be carefully guarded against for twelve months, after which, I think it probable that the inguinal canal will be safe, especially in the case of a growing child.

The laxity of the peritoneum in the neighbourhood of the inguinal region is a matter to which I have not previously alluded, although it plays an important part both in respect of the incidence of hernia and of its operative treatment. Physiologically, it is, of course, adapted to meet the requirements of the bladder in its varying conditions of collapse and distension. To this laxity of the peritoneum we owe several things. In the first place, we are largely indebted to it for the occasional occurrence of direct inguinal hernia in young people—a rare affection, which would, I think, be impossible were it not for the voluminous arrangement of the peritoneum at this place. It would seem that this form of hernia can occur suddenly, and independently of the presence of a pre-formed sac, in which case it is probably the only form of abdominal hernia that can, and it will therefore be the only form of hernia to which the time-honoured name of "rupture" can properly belong. In the course of operative treatment, however, the looseness of the peritoneum stands us in good stead, for it enables us to pull down the neck of the sac so as to bring it easily within reach when we desire to apply the ligature.

But there are certain circumstances that interfere with our application of the ligature to the neck of the sac, and these are of great importance, and, strange to say, have been sadly overlooked by writers on hernia. There are two such conditions to which I will refer—(1) The close relationship of a portion of the bladder to the neck of the sac; and (2) hernia of the sigmoid flexure on the left side. I have elsewhere called attention to the frequency with which the bladder, or a diverticulum from it, has been seen at the neck of the sac in operating for hernia in children; and of late, I have seen with increased frequency a portion of that viscus in operating upon adults. Now, it is obvious that where the bladder intrudes its presence at the neck of the sac, the application of a ligature at the surgeon's seat of election will be interfered with. I have found, however, that in such a case the bladder may be quite easily peeled off the sac, a proceeding that is facilitated by the introduction of the index finger into the latter structure.

It appears to me that a great deal of unnecessary mystery has been imported into the subject of hernia of the bladder, the etiology of which is quite simple; and further, I do not think that it need ever be a serious obstacle to the satisfactory clearance of the inguinal canal. In a word, I see no reason to doubt that hernia of the bladder is always secondary to an ordinary hernia, and is an accidental result of the dragging down of the vesical peritoneum through the hernial orifice.

I come now to a form of inguinal hernia which presents points of similarity with hernia of the bladder—hernia of the sigmoid flexure on the left side. I cannot understand how the importance of this variety of hernia has come to be so under-estimated by authors. In my experience it has proved to be of remarkable frequency; it requires very special management, in default of which, recurrence is almost sure to take place. Yet, strange to say, on consulting authorities I find only the most cursory allusion to it, and nowhere have I found any adequate description of an appropriate mode of dealing with it. In this variety of hernia, part of the peritoneal reflection which invests

the sigmoid flexure enters into the formation of the sac, so that a certain portion of the sac is intimately connected with the gut. It therefore becomes impossible to ligature and remove the sac in the ordinary way; while to be content merely with removing the free portion of the sac, and to push the upper portion of it with the attached bowel back into the abdomen, would be to perform a very imperfect operation and to court failure, no matter what ingenious device might be adopted with the vain and futile purpose of fortifying the abdominal wall, and closing the canal by sutures.

With regard to the etiology of this form of hernia, it appears to me a most remarkable circumstance that all authors seem to agree that it is of congenital origin, while they say really very little about it. Now, I hold that all forms of oblique inguinal hernia are of congenital origin, but the only form that has given me pause and caused me some hesitancy is this particular form we are discussing. Why surgeons who believe that inguinal hernia is commonly acquired should look upon this form, of all others, as congenital, I am at a loss to conceive, for the truth is that we meet with it only very seldom in childhood, but very frequently in adults. In 115 operations for hernia in children, I have met with this variety of hernia only once; while in a relatively inconsiderable series of adult operations, I have met with it three times. The ages of my patients have been 2, 22, 32, and 68 years.

With respect to the etiology of the condition, I have no doubt whatever that it is fundamentally the same as that of all other varieties of inguinal hernia, and that we must look to the presence of a congenital sac in the inguinal canal, which is probably always in this case a portion of the processus vaginalis unclosed.

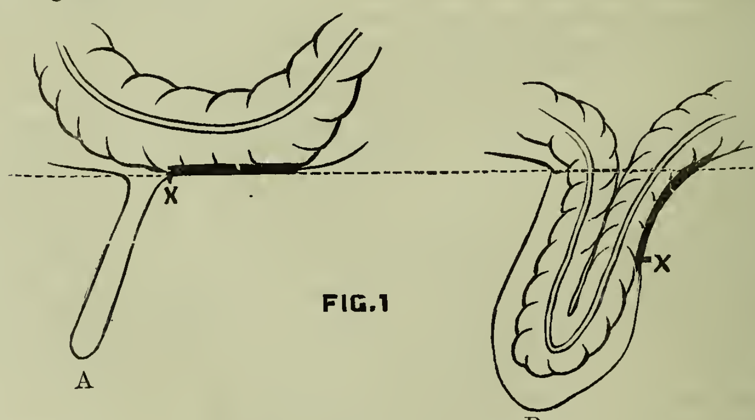


FIG. 1

A B

The spot marked X corresponds in both figures, and indicates the involvement of the bowe with the sac.

These two diagrams (Fig. I, A and B) will serve to indicate the mode of formation. The first figure (A) shows that the peritoneal process has been derived from that portion of the serous membrane which is in the immediate vicinity of the sigmoid flexure, so that this portion of bowel lies bound down close to the mouth of the opening. If hernia is to occur at all into this open tube, it will almost necessarily be the sigmoid flexure which will come down, and it seems not unreasonable to assume that this occurrence is in such a large number of cases delayed for years by reason of the substantial nature of the large bowel, and its fixation close to the neck of the sac rendering it less favourable to protrusion than would have been the case if the smaller gut were presenting. The second figure shows what happens when the bowel does at length descend into the sac. By reason of its attachment to the peritoneum at the mouth of the sac, this portion of peritoneum is subjected to traction such as could not be exerted by a herniated portion of smau

bowel, and as the peritoneum in this neighbourhood is lax and voluminous, it readily becomes dragged down in such a way as to produce the condition we are considering.

The correct management of this kind of hernia is of great importance, and is very simple. The portion of the sac to which the bowel is attached should be cut away from the remainder, and returned into the abdomen with the gut. This is effected by running the scissors up on either side of the prolapsed gut as high as possible, and after the bowel has been returned, the remainder of the sac may be ligatured and removed in the ordinary way. Of my cases, the man aged sixty-eight had worn a truss for thirty years. The hernia was very large and irreducible, the opening in the abdominal wall was enormous, and was closed by Bassini's method. The man aged thirty-two, an officer in the merchant service, and the child, were both treated by simple removal of the sac, as I have just described. All three were operated upon more than three years ago, and all are free from recurrence. The man aged twenty-two was operated upon only three months ago. In all the adults the canal was opened up by incision of the external oblique aponeurosis; in the case of the little child, I considered this step unnecessary.

Whatever divergence of view there may be as to the part played by the congenital sac in inguinal hernia, when we turn to femoral hernia, there would at first sight appear to be no room for doubt. All authors are agreed that femoral hernia is always acquired, the anatomy of it is simple, and there is no funicular process to complicate matters, so that it would appear as though I was on safe ground when at Brisbane I made the following allusion to the subject:—"Femoral hernia is the type of the true acquired hernia. The anatomical structures concerned are eminently favourable to it; the clinical manifestations are consistent with it, and they are consistent with nothing else. . . . . To put it tersely, in femoral hernia it is the hernia that forms the sac; in inguinal hernia, it is the presence of a sac that causes the hernia." I am glad now to find that in the succeeding sentences I indicate some doubt as to the absolute truth of the foregoing statement, for since we last met, three years ago, I have entirely changed my opinion as to the etiology of femoral hernia. I now believe that, like inguinal hernia, femoral hernia is caused essentially and typically by the presence of a congenital sac in the crural canal, and the question, as to which I am in some doubt, is not whether femoral hernia is ever of congenital origin, but whether it is ever truly acquired.

In order to arrive at the explanation of the congenital sac of femoral hernia, we have to go back to the second month of fœtal life, at which period the appearance of bud-like processes, four in number, on the surface of the embryo signalises the commencing development of the limbs (Fig. II.). A section made of one of these limb-buds and the adjacent body-wall (Fig. III.), will show the parietal layer of the mesoderm throwing out its bud, which is covered by the ectoderm externally, and lined internally by a specialised layer of its own cells, which become flattened, and ultimately develop into the endothelial cells of the peritoneum. Now, it would seem that all the important changes in the development of the embryo are accompanied by the development in the evolving structures of a vascular system, at first absolutely simple and direct in plan, but which, through having to follow the varying contortions of the developing mass, becomes likewise contorted, and apparently eccentric in arrangement. I imagine that every artery and every portion of an artery in the body, no matter how tortuous its arrangement may be now, at its inception took the shortest and most direct route from its origin to its termination. Its course was, in fact, a straight line, and the arterial tortuosities with which the dissecting-room has made us familiar, may be regarded as an accurate though necessarily imperfect sketch-in-outline of the embryonic changes that have culminated in the full development of the organ to which

the artery is distributed. This is most clearly seen in the larger arteries, especially those of the head and trunk, but wherever we find an artery taking a circuitous route, or coming off from its parent trunk at such a point, that it has, as it were, to retrace its steps in order to arrive at its area of distribution, we may safely take it as a guide to aid us in understanding what went on in the process of development. It will suffice to suggest as instances, taken almost at random, the peculiar windings of the pudic artery; and again, no instance in the body is of more immediate interest than the developmental history attaching to the little ascending palatine branch of the facial, which runs vertically upwards beside the wall of the pharynx, passes over the top of the superior constrictor, and then down again with the levator palati muscle on to the upper surface of the soft palate.

FIG. 2

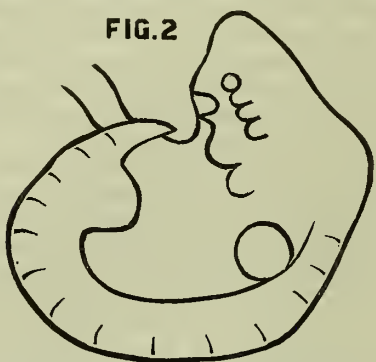


Diagram of embryo at about fourth week, showing commencement of limbs.

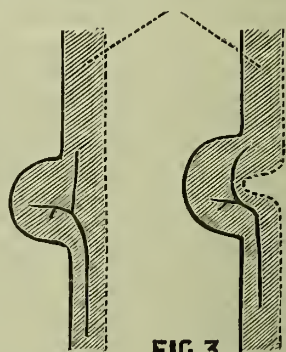
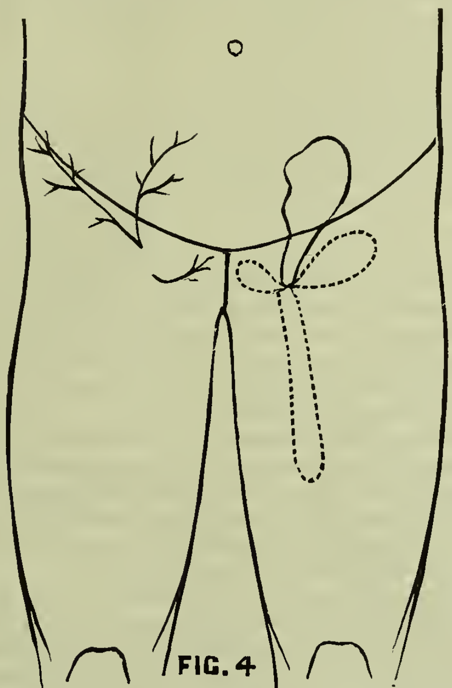


FIG. 3

Diagrammatic section of posterior limb-buds; in B, formation of peritoneal pouche is shown. The shaded portion represents the mesoderm; the dotted lines the layer of cells destined to form the peritoneum.

I wish now to direct your attention to a group of humble little vessels, branches of the common femoral artery, the superficial circumflex, iliac, the superior external pudic, and especially as the most typical and useful for our purpose, the superficial epigastric, which turns upwards across Poupart's ligament to be distributed on to the abdominal wall (Fig. IV.). Why does it take this course? The reason will be at once evident when we refer back to the first beginnings of a vascular system in the embryonic limb-bud. The first branches that are given off from the main artery will be distributed to structures that are destined to form part of the abdominal wall; so that when, in the course of development, the groin becomes deepened, and the limb having become lengthened, prepares to pass through an arc of about 145° or more to attain its permanent relationship with the trunk, it is at once seen how it comes about that the superficial epigastric artery and its companion follow the course they do. Turning again to the diagram of the limb-bud, it is easy to understand that in the initial steps of its development there is a distinct possibility that a little pouch from the wall of the pleuro-peritoneal cavity may be involved in the projecting process (Fig. III., B). This is just the kind of developmental accident that is certain to occur sometimes; and when it does, it is obvious that the future of this diverticulum will be subject to precisely the same influences that have determined the peculiar course and position of the superficial epigastric artery and its fellows. To put it plainly, the sac of a femoral hernia, when it turns upwards over Poupart's ligament, or outwards towards the iliac spine, as it frequently does, occupies that position because it always has occupied it ever since the early embryonic period which witnessed the commencement of the limb. The fundus of the

sac became accidentally involved with the abdominal wall then, and the development of the limb and its assumption of its normal position has brought about such lengthening of the sac, as will obviously be inevitable.



On the right limb are shown the branches of the common femoral artery; on the left, the situation occupied by the large femoral sacs. The upper of these represents accurately the case described in this paper

In cases of femoral hernia in which the sac simply protrudes at the saphenous opening, and they constitute the very large majority, the difference is simply a difference in the size of the sac; that is to say, at its origin the pleuro-peritoneal pouch was too short to become implicated with the abdominal wall.

Let us now see how our theory agrees with the observed clinical features of femoral hernia. It is well known that when femoral hernia attains a large size, it has a tendency, after emerging from the saphenous opening, to turn upwards across Poupart's ligament, or more commonly, upwards and outwards towards the iliac spine. Surgeons have never been quite satisfied with the theories that have been advanced to explain this circumstance. This is not very surprising, seeing that it has been found necessary to invent and adopt erroneous explanations because the true one has been missed. There is no conceivable theory which will explain why, in one case, a large femoral hernia should pass upwards on to the abdomen, in another case downwards, almost to the knee, (3) in yet other cases, outward in the same direction as the circumflex iliac vessels, or inwards and upwards to the scrotum or labium, (3) except the theory of congenial origin of the sac; and this explains it perfectly, when we come to consider the mode of development of the limb, and the variation in the ultimate destination of the sac that may be induced by slight accidental differences in position at the time of its inception.

Assuming this view to be correct, the fact that in one case a femoral hernia will enlarge painlessly to a great size, and in another will be unable

(3) Macready, "Treatise on Ruptures," p. 168.

to increase beyond the size of a walnut, presents no difficulty; it is a question of the original size of the sac. The large hernia, while it is steadily increasing in size, is increasing, not by gradual enlargement of the sac, but by gradual lengthening of the mesentery. The long mesentery observed in hernia has been regarded, I believe quite erroneously, as a contributing cause of hernia, whereas it would appear with more probability to be the result of the presence of a large sac.

A few weeks ago I removed from a lady a large femoral sac which is accurately represented in the diagram. She gave the history that for six years it steadily enlarged, and then for three years she wore a truss, so that it had existed nine years in all. During the six years while it was growing it gave her so little pain or inconvenience that she could tell me very little about it. It used to disappear when she lay down at night, but she never noticed how it disappeared, or how long it took to do so. In fact, she took no intelligent notice of it whatever. Then eventually she consulted a lady practitioner, who advised her to wear a truss, which she did for three years. When she came to me for operation, there was no hernia to be seen, but the large sac filled with peritoneal fluid when she stood up without the truss, forming a large hydrocele on the front of the groin and abdomen. The case is a rare one, but by no means without precedent.

You will notice that a small loculus or diverticulum is shown (Fig. IV.). This is a very commonly seen feature of the congenital sac of the inguinal canal, and is, I believe, an almost invariable accompaniment of imperfect descent of the testis, although it is often seen where the descent of the testis is perfect. As I have elsewhere pointed out, it constitutes the anatomical basis of interstitial and pro-peritoneal hernia. ([4])

I am afraid I shall disappoint you if you look for the announcement of a royal road to the cure of femoral hernia, based upon the theory of the congenital origin of the sac. The only effect upon our operative procedure, and that effect is one by no means to be despised, will be to cause us to abandon vain endeavours to block the crural canal, or close the crural ring by sutures or other device.

The first step in the establishment of a sound method of treatment must always be to seize upon sound pathological principles to be our guide, and the only deduction I am able to draw from the view that the femoral sac is congenital, is that removal of the sac from the femoral canal is the essence of the treatment; that the fault lies in the presence of the sac, and not in the construction of the canal; and that we are thereby directed to remove the sac, and leave the canal alone. How best to remove the sac I am a little uncertain. I have hitherto always contented myself with ligaturing the sac as high up as possible, but other methods for removing the stump from the neighbourhood of the crural ring have been suggested, and are good in principle. But the point is clear, that whatever means are adopted to achieve this object are certain to be more efficiently carried out if we quite understand that the essential feature of the operation is the removal of the sac, and not any form of obstructive treatment applied to the crural canal.

I should like to add a very few words with reference to the occurrence of hernia in situations other than the inguinal and crural canals, such as the obturator and ischiatic foramina. Is there also a pre-formed sac in these situations? I may answer the question as far as I myself am concerned by saying that, if I could believe that a hernia could pass through the obturator or ischiatic opening, in the absence of a congenital sac, I should scatter to the winds the views I now hold on the subject of hernia, and be prepared to believe anything. All our knowledge of the nature and capabilities of the intra-abdominal pressure, and of the difficulty that it experiences in forcing a hernia even into a congenital sac, forbids absolutely the belief that it could

([4]) *Intercolonial Medical Journal of Australasia*, May 20, 1900.

ever be enabled to force a piece of bowel or omentum through such small apertures as those I have mentioned, pushing the peritoneum and fascia before it. On the other hand, the occasional presence of a pouch of peritoneum in these situations is not by any means a source of perplexity, but, on the contrary, is only what we might expect. Whenever structures like the obturator and ischiatic vessels, that inside the abdomen are in intimate relation with the peritoneum, pass outwards in the course of development, it is easy to understand that occasionally a little of the peritoneum may be made to accompany them for a short distance, and I would suggest that if some of our pathological friends who have the opportunity of making large numbers of post-mortems would examine these hernial orifices in a large number of bodies, they would be enabled to make some very valuable and interesting observations with reference to this matter.

In conclusion, let me explain in a very few words why I have not troubled you with any statistics. This is not, I am happy to say, because there is anything for me to conceal, or because they would show anything to weaken my contention as to the congenital origin of the hernial sac. If, however, there is one thing more than another with which I have been impressed by discussion of this subject, it is the absolute inutility of mere statistics. Statistics are valueless and misleading unless we bring to their interpretation sound and correct pathological or etiological principles; but the principles must come first. If we put the statistics first, and try to extract principles from them, we shall not only fail, but we shall certainly be misled. The reasons for this will be sufficiently obvious if you will think the matter out, but I will not detain you by dilating upon them, for I have already occupied your time sufficiently. My aim has been to show cause, and afford a stimulus for a fresh scrutiny of the subject of hernia, and I shall be well satisfied if this contribution to the Proceedings of this Section of our Congress shoud prove to be of some utility in furthering the rational and scientific treatment of one of the most common and important of the ailments with which we surgeons are called upon to deal.

SIX CASES OF CONGENITAL HIP DISLOCATION TREATED BY LORENZ'S METHOD OF REDUCTION UNDER CHLOROFORM, AND SUBSEQUENT FIXATION OF LIMB IN A FULLY ABDUCTED POSITION.

BY

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I have now treated seven cases of congenital hip dislocation in private practice and at the Childrens' Hospital in Melbourne; the results in some of the cases are imperfect, but as the treatment is still on its trial, I hope I may be pardoned for giving my experiences. I very much regret that I am unable to show you the cases, but the first three on the list have already been exhibited before the Medical Society of Victoria, when they called forth some interesting criticisms.

Case 1.

A.K., æt. three years, female. Lame in left leg since she began to walk, and getting markedly worse; pain in the knee; always falling; walks with waddling gait, and with her arms out to balance herself; cannot walk any distance, and very soon gets tired; general health bad, peevish and cross. One and a half inch shortening of leg.

The patient was anæsthetised till the muscles were fully relaxed; a band was put round the perinæum and another round the ankle, and steady extension made; it was then found that the head of the femur would not came down to the level of the acetabulum, and that the adductor longus tendon was fully on the stretch; this was divided subcutaneously, and the head came further down, so that the trochanter was below Nélaton's line. The assistant now steadied the pelvis, and the operator, with the left hand still pushing down the trochanter, flexed up the thigh to right angles with the body, then, by a process of extension, rotation (outward and inward), and abduction, the head slipped over the primitive posterior rim of the acetabulum, with that pleasant sucking sound we all know so well. The position of the limb was now abducted flat with the table, and flexed to a right angle with the body. I then proceeded, by rotation movements, to screw the head of the femur into the shallow acetabulum, and in doing so relaxed some of the abduction, and the head immediately slipped out again, and the operation had to be repeated. The child was then drawn to the edge of the table, and a firm spica plaster of Paris bandage applied, with plenty of cotton wool beneath, especially (as experience taught) where the adductor muscles were attached to the pelvis; this is where chafing principally occurs when the child begins to walk later on. I also found that it was very important that the first plaster should be strong, and allowed to stay on as long as possible, and with that end in view, I strengthened it with perforated zinc strips. A patten, or cork sole, of 2 inches in height was then placed on the sound side, and the child encouraged to walk as soon as possible; in this case, within a week the child was walking with crutches, and within a fortnight without them.

Lorenz advises that the plaster of Paris should be left on for three months, and then the limb put up at a lesser angle for another three months, gradually reducing the thickness of the patten, but I should advise a considerably longer period of fixation in abduction, to prevent relapse.

In this case, although the plaster was used (at lessening angles) for a year, and then the patient allowed to go about without one, but with a heightened shoe on the sound side, there was, and is still, a tendency to relapse, and I am not quite sure of the joint now, two and a half years afterwards, and still apply a plaster at irregular intervals.

The condition of this child, as described by the mother two weeks ago, was this:—"The general health of the child was always good, but she never now complains of being tired, as she constantly did before treatment. Whereas, before the treatment she could not walk 10 yards on the level without falling, now she never falls. She walks a mile to school, and a mile back, and never feels tired, and is running about all day in the most surprising way." The birth was normal, and the mother had a natural labour. The child still has a slight limp, and there is half an inch shortening, but the limb can be pulled down to make less shortening than half an inch.

Case 2.

C. P., æt. four years, female. When first I saw her on October 10, 1899, I received the following history:—The child was turned before delivery; she has limped ever since she could walk; first noticed right leg shorter than left at five months old.

On examination, one and a quarter to one and a half inch shortening. The extra quarter inch shortening was made by pushing up or standing on the affected side. When she started to walk at twelve months, she limped slightly, since then the limp has been getting worse; she now complains of feeling tired, and very easily falls down; in walking, she often balances herself with her arms out horizontally; always peevish, puny, and out of sorts generally. The dislocation was a dorsal one.

Under chloroform, I reduced the dislocation after necessary division of the adductors, put up in plaster, and in two weeks she was walking well without crutches, and with a 2-inch patten. Eight months later the plaster was permanently removed, and a spica bandage applied, with the idea of helping to keep the head in position (not that it is of much use in this way).

It is over two years now since operation, and this is her condition:—Three-quarters to one inch shortening (an improvement of one-quarter to half an inch shortening); the head of the bone does not push up, but it seems to have slipped forward, and became an anterior dislocation, instead of a dorsal one; but when I first noticed this, as it could not be pushed up I preferred to leave it there, imitating an operation by Treves devised for this condition, by making an artificial acetabulum below the anterior inferior spine.

The following is a letter I received from her mother two weeks ago:—"Dear Doctor,—Before treatment C. was peevish, and had a poor appetite, but since treatment is quite a different child; she is now contented, and eats and sleeps well. She now walks a long distance and never complains, whilst before treatment she was always tired and had to be carried. She used to stumble and cut her knees, but now she does not, and runs and skips as well as any child could. She is much stouter and firmer about her thighs and legs, and is, I am very pleased to say, a very different child from when she first came to you for treatment."

In this case, unlike the former, there is a firm joint in the anterior position, and the head cannot be pushed up. I do not fear relapse in this case, as I do in the first case. There is good movement, and lordosis is not so marked as before treatment in this or in the preceding case.

Case 3.

P. E., aged one year and nine months, female, has had a limp since she could walk, at eighteen months; goes down markedly on the left side, and

waddles; often puts hand to back of left buttock in walking, and there is marked lordosis; she very easily falls, and always wants to be carried; the limping has been getting decidedly worse the last six weeks. There is three-quarters of an inch shortening, but under chloroform the left trochanter can be pushed up an inch and a half above Nélaton's line, and can be easily drawn down well below it. Sometimes the mother would hear a crack in the hip whilst washing the child. The foot turned in, and the dislocation was dorsal. The birth of this child was normal. There were six children in the family, only two others living, two having been still-born, and one died from measles. The mother, when two and a half months pregnant, saw her brother's child, who has a double congenital dislocation, and looks upon it as a case of maternal impression.

The hip was easily reduced, and treated in the ordinary way, being kept in plaster for eight months, and now, more than two years afterwards, the child is absolutely well.

Extracts from the parent's letter read thus:—"Her thigh is perfectly well. She gallops about in perfect style, climbing on chairs, boxes, or anything else, as well with one leg as with the other; can walk three miles with ease, and does not feel tired afterwards," and so on.

In short, the hip is perfectly well, and there is no shortening, or limp, or anything abnormal about the joint, and no sign of relapse, although she has been wearing nothing on the joint for over six months.

Case 4.

This case is a cousin of the above, and I may mention that these two and the former case were kindly sent to me by Dr. Stawell, of Melbourne.

J. C., æt. six years. A case of double congenital dislocation. She is an only child, and the birth was normal, though the labour was somewhat protracted. Both legs, from anterior superior spine to internal malleolus, were 20½ inches, and the trochanters were above Nélaton's line 2¼ inches. They could be pulled down only about 1 inch; when they were pushed up by body-weight, they measured—right 19½ inches, left 19¼ inches. The heads were both displaced backwards, and the amount of lordosis was considerable. If a perpendicular was let drop between the angles of the scapulæ to the cleft of the buttock, 1½ inch represented the distance between that line and the lumbar region. She could not walk 50 yards without getting very tired, and was constantly falling over the slightest inequality. A slight push by a child would knock her over, and her gait was one more of shuffling along with her shoulders (often with her arms out) than walking. Her thighs and calves were ill-developed, as she did not seem to use these muscles for walking, but her progression seemed to be more by swinging first one side forward and then the other.

Under chloroform, even after tenotomy of the adductors, I was unable to bring the trochanter near Nélaton's line, so I put her to bed with extension weights, in the hopes of helping to bring down the trochanter; after two weeks of extension I again assayed, without success. I then cut down in a line with the greater gluteal fibres, behind the trochanter, and defined the obturator internus and gemelli; the head could then be easily felt on rotation above the acetabulum slipping backwards and forwards. I now incised the capsule antero-posteriorly (it was very thick), and explored the joint with my finger. The acetabulum was full of a velvety fatty mass. On full extension, the head did not descend in the slightest, nor was the the capsule made tense, but the adductor region, the hamstrings, and tensor vaginal femoris were, and they were divided. Hoffa's opinion is that the muscles attached to the greater and lesser trochanters are shortened, and need division, but Lorenz thinks that they are lengthened. I have not found it necessary to divide them. On manipulation, the head of the bone now

slipped in with a well-defined sound. A plaster was put on with the limb in a fully abducted and flexed position, and the child was nursed by her mother.

Unfortunately, the plaster got dirty with fæces and urine, and an abscess formed, which opened in the groin, during which time she had considerable knee-pain, and the plaster had to be removed, and gradually the difference in the length of the limb decreased from one and a half inch longer to only three-quarters of an inch longer than its fellow. The head of the bone is not in the acetabulum proper, but is now in a much better position than it was formerly.

Eighteen months later I treated the other side. After four weeks of 6 lbs. extension in bed, which produced half an inch lengthening, I tried reduction in a private hospital with simple extension under chloroform, but without success. I then made an incision in front of the trochanter; after the division of the adductor tendons and tensor vaginæ femoris, and other bands of fascia, which became tense on extension, I then divided the capsule, which was very thick, from above downwards, and inserted my finger into the joint; the acetabulum was not so well marked as on the other side, as it had been longer out of use. On forcible extension, the hour-glass contraction of the capsule could be well made out as the obstruction to reduction. The incision through the capsule was carried further down through the constriction, and the bone then slipped through, and was reduced with a click. It was put up in plaster, and healed by first intention, and the child walked well with a patten on right foot. The great advantage of the anterior incision in children is that the wound does not run the same chance of being soiled.

It is now two years since the right thigh, and eight months since the left thigh, was reduced. The right side, where there was suppuration, has only slight movement in the joint, and is some what fixed at an angle of a little less than 45 degrees. The head of the bone is above and behind the acetabulum, and cannot be pushed up. The left thigh has free movement in all directions, and cannot now be pushed up, although the head is above the acetabulum.

The amount of lordosis was measured before operation from a perpendicular to the furthest point of the spine. Before operation it was one and a half inch, now it is one inch.

Present condition.—In walking, the mother says she is much firmer than she was. The whole of her body used to sway, and she used to work her passage with her shoulders, swinging her lower extremities rather than using the muscles. Before the operation the legs and thighs seemed to be dwindling away. Since the operation she uses her legs and thighs to walk with, and they have developed well. Before the operation she would very easily trip and fall, even a child's touch would knock her over, she would very easily tire, and could not walk a hundred yards. Now she can walk four times as far, does not tire nearly so easily, and is just as firm on her legs as other children of her age. She hardly ever sits down, and is on her feet all day. She is not wearing any appliance at the present time.

Besides the above, I have had two cases, one a single dislocation in a child of four and a half, which required the open operation for reduction, and the other a case of double dislocation in a child of four years. I have reduced one side; but both cases are too recent to report.

The principal practical points that have struck me have been the ease and perfect success of the operation if done very early, within a few months of the first walking of the child. The mother of one of my cases was well up in the condition, as she had seen the results of it in her niece. Every month the child walks on the limb makes the reduction more difficult, and the result less likely to be satisfactory. The capsule is stretched, then becomes

thickened and hour-glass shaped; the muscles and fascia round the hip-joint adapt themselves to their new position, and in one of my cases I could not have divided or extended further, as the sciatic nerve and the sheath of the femoral vessels were fully on the stretch.

When I showed three of my cases at the Medical Society of Victoria, Dr. Irwin Hunter thought that in the more successful of my cases the condition was not that of want of development of the acetabulum, but that an ordinary dislocation had occurred during birth, and the acetabulum was normal. Skiagrams taken of two of my more successful cases, however, showed want of development of the joint. These skiagrams, I regret to say, were too faint to show satisfactory prints, as the spark of our Children's Hospital instrument is not strong enough for hips.

Then, again, with one exception, the birth had been normal in the foregoing cases. The second case (C. P.) was turned to complete labour.

In the most successful case of all (P. E.) there was some heredity, as the mother's brother's child had a double congenital dislocation. After reduction, in all the cases the head would slip out easily if abduction were reduced the slightest, showing that the acetabulum was not properly developed; after reduction of an ordinary hip-joint there is no such tendency to slip out again.

Mr. Reeves, Senior Surgeon to the Royal Orthopædic Hospital, London, writes on the treatment of this condition in the *Lancet*, Nov. 23, 1901, as follows:—"When the pathological anatomy of this malformation was first described, it was thought no operation could remedy it. I am one of those still holding that view. I have never been able to satisfy myself that any cutting procedure, except tenotomy, offered anything like a permanent prospect of what I should consider a practical cure, or that the results could, in the slightest, attempt to compete with the mobility and usefulness of the limb before operation."

In answer to this, my case (J. C.) of double dislocation with the operation on both sides is interesting. On one side, where there was some suppuration, there is certainly some anchylosis, but there is stability, and on the other side there is good movement and stability, and the mother is quite satisfied the condition has improved considerably since the operations.

I do not see why the open operation should interfere with mobility; I think it would often do away with the supposed necessity of dividing subcutaneously so many muscles, as the capsule is often the trouble, and not the muscles. The hollow of the acetabulum can be curetted (as it is generally full of a soft fatty material), and so make more room for the head, and the exact condition of the rim can be made out. Where there is little or no rim, I am doubtful if Lorenz's method is sufficient to keep the head of the bone in place when the child is walking, and I feel inclined to favour some operation, such as Professor Witzel's, who drives in four or five pins horizontally above the head of the femur, after it has been reduced and held by plaster in the rudimentary acetabulum.

I should like to hear from members present if they know of any cases of congenital dislocation of the hip which have grown up with or without treatment, and what is their present condition? Mr. Reeves describes the joints as "misplaced, but otherwise very serviceable joints." Do the members present agree with this description? Mr. Reeves says:—"I must confess that I am sceptical as to the claims of those who state that by this bloodless method they get perfect results." I can only say that he would be interested to see P. E., one of the cases I showed at the Medical Society of Victoria, and sent to me originally by Dr. Stawell. It is now two and a half years since the joint was reduced, and she is now perfectly well; but then she was treated when just under two years old, before the muscles, capsule, and fascia had had time to get distorted.

Conclusions.

That the earlier the treatment is started the better. That the Lorenz bloodless method will give perfect results, especially if the case is very young. In most of the older cases, the bloodless method can still be used, and it will retain the head of the bone in a better position, if not actually in the acetabulum; I have found considerable difficulty in keeping the bone in position by the plaster when the cases are treated as out-patients, when we must depend a good deal on the sense and regular attendance of the mother. When the plaster is on, it is difficult to tell when the bone is in good position, and a bi-weekly examination by an X-ray screen would be a great advantage.

Mr. Tubby says that, in children under seven years, the treatment is unformly successful. I somewhat doubt if the result is uniformly perfect.

Schede says, that out of ninety-nine cases (from infants to those of fifteen years old), he reduced the dislocation in ninety-eight by external manipulation. From my experience, no one else could expect such a result, for out of seven hips treated I found it necessary to use the open operation in three, and in future I should prefer the open operation to very extensive muscle division, or the use of very forcible extension, owing to the danger of rupturing one of the large vessels. With the open operation, one can divide the capsule, which is the main hindrance to reduction, and then feel exactly what else, if anything, needs further division.

In cases of relapse or unsatisfactory result, I should feel inclined in future to use Professor Witzel's idea of putting pins into the upper rim of the acetabulum to retain the head in position, or I have an idea of fixing a bone-graft in that position with ivory pegs, but have not had an opportunity of carrying it out.

In conclusion, I may say that, although my results have not been so good as those reported from the Continent, yet they are sufficiently encouraging, and as I have not seen any reports of the operation having been done in the States before, I felt that you might think them sufficiently interesting to bring before the Congress.

DARK SCLEROTICS AND FRAGILITAS OSSIUM.

BY

C. F. Hodgkinson, M.B., Tasmania.

The following article, by Dr. Alfred Eddowes, on the associated conditions of dark sclerotics and fragilitas ossium appeared in the *British Medical Journal* of July 28, 1900:—

> "At the last annual meeting of the Dermatological Society of Great Britain and Ireland, I showed a young woman suffering from eczema, who had remarkably dark sclerotics. When she first consulted me on account of her eczema, my attention was arrested by the extraordinary transparency of the whites of her eyes, which allowed one to see the dark pigmentation of the choroid underneath. I asked her if she had ever had any bones broken, and she told me she had several times; on one occasion when she had merely fallen on the bed. She also told me that her father's eyes were like hers, and that he had several times broken his bones, and that only recently he had broken an arm by putting his coat on. My reason for putting the questions to the girl was, that when in general practice twenty years ago I met with a little boy who, during the two years that I was his medical attendant, suffered from no fewer than nine independent fractures. He fractured his arms four times, and thighs and legs five times, in addition to a light green-stick fracture of the tibia, which his mother treated herself, by binding the limb at the seat of fracture with a necktie. This child had the darkest sclerotics which I ever remember to have seen. From enquiries that I have made from several well-known surgeons, this association of dark sclerotics and fragility of bones has not been recognised. Treves, in his well-known work on "Surgery" (1895), says that we had better admit that we know nothing about the cause of this condition in bones. This being the present state of our knowledge, I think my observation is worth publishing. I would suggest that the transparency of the sclerotics indicates a want of quantity or quality of the fibrous tissue forming the framework of the various organs of the body, and probably explains the want of spring or toughness in the bones of these peculiar individuals."

The appearance of this article led me to make enquiries as to the occurrence of fractures in one of my patients—Mrs. B.—in whom I had previously noticed a marked blue condition of the sclerotics. As a result of my enquiries, I obtained the following family history:—

Father, Mr. H.—Has dark sclerotics: had both legs broken below the knee, one leg once, the other twice, by slight falls: also a fracture involving one elbow-joint. The fractures occurred before the age of twenty: present age, fifty-five.

Mother, Mrs. H.—Sclerotics normal: has had no fractures.

There are eleven children in the family:—

1. J. H.—Sclerotics normal: has had no fractures.
2. Mrs. B.—Has dark sclerotics. When eighteen months old she had her right leg broken near the ankle, by a blow with a hammer, by a child of about the same age: at about seven years her left clavicle was broken by falling from a stool on to a tub: a year later the bones of the right lower leg were broken by a fall while at play: at eleven years the left knee was injured (? fracture) by falling down a flight of four steps:

at fourteen the left fibula was broken by slipping into a wheel-track on a frosty morning: at twenty the left wrist was injured (? fracture). There still remains unmistakable evidence of these injuries, in the deformities produced by inaccurate apposition of the fragments.

3. G. H.—Has dark sclerotics: had one leg broken twice between six and seven years of age, and the other leg broken at nineteen; had one forearm broken and one humerus broken near the shoulder at twenty-two. His sister tells me that he is a jockey, and has sustained other injuries, of which she knows very little.
4. Alfred H.—Has normal sclerotics, and has had no fractures.
5. Ada H.—Has dark sclerotics: at four years had one forearm broken by a slight fall while walking: between seven and eight, she had one lower leg broken in a similar manner.
6. Kathleen H.—Has normal sclerotics, and has had no fractures.
7. Mrs. D.—Has normal sclerotics, and has had no fractures.
8. Alice H.—Has dark sclerotics: had one thigh broken twice, first at six months, and again at fourteen years, by slight falls: at about four years had right lower leg broken twice: at three years had one forearm broken.
9. William H.—Has dark sclerotics: had his right lower leg broken when four years old.
10. E. H.—Has normal sclerotics, and has had no fractures.
11. John H.—Has dark sclerotics, and has had one leg broken twice.

Fractures among the children become so frequent that the father kept a supply of splints and dressings, and attended to the cases himself.

I regret being unable to obtain any history as to Mr. H.'s parents, who died when he was a child, and of whom he knows nothing.

The notable points in this history are that only those members of the family with dark sclerotics have had any bones broken, that the fractures were all caused by trivial accidents, and that they all occurred in early life. In every case union took place in the usual time.

I can find no reference to the association of these two conditions in a number of text-books which I have consulted, and I am unable to suggest any explanation, other than that mentioned by Dr. Eddowes.

SOME POINTS IN THE TREATMENT OF DEFORMITIES ARISING FROM ANTERIOR POLIOMYELITIS.

BY

W. KENT HUGHES, M.B. (London), M.R.C.S. (Eng.).

IN dealing with deformities developing subsequent to an attack of anterior poliomyelitis, we have to contend with contracted muscles and ligaments on the one hand, and weakened muscles and lengthened ligaments on the other. It is too often taken for granted that a mere tenotomy of the contracted muscle is sufficient, if not all that is possible. On the contrary, except in the case of simple talipes equinus, it is seldom that a case will not benefit by division of ligaments. For instance, in a case of talipes equinovarus after division of the tendo achillis, the inner border of the foot should be put upon the stretch, and a tenotome entered at Parker's point just in front of the lower end of the external malleolus, and free division made of the capsule connecting the astragalus and scaphoid, the anterior and inner fibres of the deltoid ligament, and the tendon of the tibialis posticus. If this is not freely performed the deformity will never be properly reduced.

Where cavus is present it is not sufficient to only divide the plantar fascia; the deep ligaments and small muscles generally demand attention. The plantar fascia I divide at the level of the tip of the internal malleolus, entering the tenotome just beneath the skin on the plantar surface, and cutting freely right across the sole down to the bone. First, there is no danger of the cutaneous nerves being involved in the subsequent cicatrix, which almost invariably happens when the fascia is divided at the most inviting and usual place about the middle of the arch of the instep, just where the nerves are emerging between the divisions of the fascia, and a painful spot is produced. Further, at the posterior point the abductores hallucis and minimi digiti and flexor brevis can be divided at the same time. And lastly, the whole of the fascia can be cut through before it splits up.

There still seems to be a great deal of timidity with regard to the use of muscles after tenotomy. My invariable rule has been to place the limb in plaster in an over-corrected position for three days to a week at the longest, and then allow patients to use and exercise the limb, with careful massage in addition. It is only in adults that care is necessary on account of a weak tendon. The latest American textbooks advise long retention (two months) in plaster in some instances. This is a most unnecessary waste of time, and, besides, does not give such good results. Only once have I had to exercise care in a child after division of the tendo achillis. The tendon was too weak to allow the child (a girl, æt. ten) to walk on it without a bandage at the end of the third day, but at the end of a month it was as firm as could be wished The older methodof performing tenotomy and putting the limb up in plaster in the deformed position is still adhered to by some English orthopedic surgeons. The only weak tendons I have seen after tenotomy have been subjected to this method. It is, in addition, a fearful waste of time.

It might seem to some unnecessary to touch upon the question of immediate rectification, but in all the textbooks recently published the older method is advocated, or long retention in plaster advised after rectification. Twelve years ago, when working under Mr. Walsham, I was always accustomed to see Syme's (of Edinboro') method of immediate rectification and early use of limb carried out, and Mr. Walsham had, I believe, for ten years previously employed this method. Only twice have I felt nervous about the result beforehand. In the first instance, a boy of six years, very marked double equinus, in whom, after division of the right tendo achillis and immediate rectification,

the ends were separated by $3\frac{1}{8}$ inches. The result was, however, most satisfactory. It is the widest separation I personally have experienced. The second case was division of the hamstrings in a boy of nine years, spastic paraplegia; the upper end of the tendons disappeared, and I put up the leg with sad misgivings, but was delighted to obtain perfectly strong union. In a week the boy was doing exercises as best he could, and being massaged.

As to division of tendo achillis, in slight cases where it is possible to maintain the integrity of, at all events, the posterior part of the tendon sheath, I divide the tendon before it begins to spread out at its insertion, entering the tenotome between the tendon posteriorly and the sheath, and cutting towards the skin. In those cases where it is not possible that the sheath can be maintained unbroken I divide the tendon freely just previous to its insertion. Division of the tendon is more awkward in this position owing to its large extent of surface, and unless care is taken the fibres at the edges will be left undivided. It is better to enter the knife between the skin and tendon and cut freely forwards.

Transplantation of tendon from a strong to a weak side has long ago passed the experimental stage, yet it does not seem to be appreciated by Australian surgeons.

The splitting of tendons is only applicable when the two muscles to be dealt with are in close proximity. In transplanting tendons there are one or two points I should like to advocate, taking, for instance, the transplantation of the tendon of the tibialis anticus on to that of the peroneus longus.

The tendons of the tibialis anticus and of the extensor hallucis are well exposed by a curved incision sloping across the proximal end of the internal cuneiform. The superficial surface of the tendon of the tibialis anticus is freshened by stripping off a thin layer with a sharp tenotomy knife for about three inches. The under surface of the adjacent portion of the tendon of the extensor hallucis is treated in the same way to the extent of an inch and a half. Sutures are passed through the lower half of the "freshened" tendon of the tibialis anticus from its deep surface, at intervals on each side, including about half the tendon. The tendon is now divided, and the foot held in a varus position while the next portion of the operation is completed. Engage the free end of the distal portion of the tibialis anticus in a pair of forceps, and pull on it well before suturing. The sutures are now passed through the under surface of the extensor hallucis in the same manner as through the tibialis anticus. Care is thus taken to partly preserve the action of the tibialis anticus. Another flap of skin is now thrown up, exposing the lower portion of the extensor and peroneal surfaces of the leg: that is to say, the tendon of the peroneus longus as it is passing round the external malleolus and the tendon of the tibialis anticus above the ankle-joint. The under surface of the tendon of the peroneus longus is now prepared in the same way as above. The tendon of the tibialis anticus can now be pulled or coaxed up under the bridge of intact skin. The sutures are passed through the tibialis anticus as before; the tendon is well pulled down by a piece of silk tied tightly round its free end, beneath the freshened under surface of the peroneus longus. The foot, meantime, is held in extreme valgus position, and the sutures are passed through the peroneus longus. The transplanted tendon must be quite taut when sutured up on to the weaker. I prefer this method to that adopted by Goldthwait and Nicoladini for the following reasons:—By passing a tendon, freshened at the edges, through a slit in a weak tendon, what will happen? The freshened fibres on the sides of the transplanted tendon will unite to the split middle strands of the weaker tendon, and though held partly by sutures, it must eventually unravel it. We must not forget that tendons are merely bundles of fibres very loosely held together, and I am convinced that in order to obtain firm union between two tendons we must apply as large freshened surfaces as possible to each other. Further, in the method I have described

the transplanted muscle pulls exactly in the direction of the old tendon, and not at an angle, as in the older method.

The skin incisions are of necessity large, and the operation should be completed as rapidly as possible in order to avoid superficial necrosis of the skin.

Tendons must be gently handled; they are not easily strangled by tight suturing, but they are very easily frayed out when once cut across. Tendon sheaths and ligaments restraining them must always be respected as far as possible, especially in those positions where a muscle changes its direction or passes round a prominence.

It may sometimes happen that the paralysed muscle is too weak to be benefitted by the transplantation of a strong tendon. In some instances it may be possible to remove the whole muscle, with a piece of the bone into which it is inserted, into a bed prepared for it. The tibialis anticus and peroneus brevis both lend themselves to this method. I believe Mr. Walsham was the first to originate this expedient in the case of the quadriceps extensor when he placed its insertion about an inch further down the tibia.

At the hip, flexion is of common occurrence, and it nearly always is due to contraction of the tensor vaginæ femoris. This muscle inserted into the fascia at both ends causes trouble, both at the hip and at the knee. Its importance has been strangely overlooked by English surgeons, though American writers have recognised its importance for some time past. To relieve the flexion at the hip a transverse incision is made below the anterior superior spine, and the fascia is freely incised until all resistance to extension from this cause is relieved. It may be necessary to proceed further and divide muscles, and to ensure success the surgeon must be both bold and careful, respecting no muscle or ligament that hinders replacement, and being very careful to preserve the vessels and nerves that are present in great numbers. In a well-marked case it is easy to diagnose the condition, either by the lordosis or by the flexion, but in minor cases it is sometimes overlooked. The extension of the leg on the thigh will always accentuate the condition at the hip, and no case should be pronounced free from flexion at the latter point that has not been examined, with the leg in full extension. The tightness of the structures may appear even to abolish motion at the hip, or, if movement be attempted with the leg flexed, a "jump" may occur as if a dislocation had taken place.

In nearly every case it will be necessary to freely divide the iliotibial band at the level of the knee-joint. An open incision is much to be preferred, as in the condition higher up, for, though there are not many important structures to beware of, yet it is very difficult to divide fascia thoroughly subcutaneously. I have these cases massaged on the fourth or fifth day, and remove the plaster in which I invariably place them, as far as possible, towards an over-corrected position.

In all cases of division of contracted muscles and ligaments I consider it is of the greatest importance to begin working the limb, &c., as soon as possible, even at the risk of bursting open the skin wound. In no instance is this of more value than in wry neck.

In reply, Mr. W. Kent Hughes said that the method of tendon-lengthening advocated by Dr. W. Moore, and supported by Dr. Syme, was no new thing, but was tried and given up by orthopedic surgeons long ago, as it was found that the resulting tendon was often weak. Subcutaneous tenotomy can hardly be called groping in the dark when referring to a contracted tendo achillis, and though in favour of an open incision where important structure, as the peroneal nerve, &c., are involved, I most certainly oppose it in such a condition as talipes equinus. It is to be hoped that the same surgeons, however, will some day express their disapproval of subcutaneous osteotomy on the foot, which should find no advocate in present-day surgery.

ULCER OF THE URINARY BLADDER.

BY

H. C. Hinder, M.B., M.Ch.

Ulcer of the bladder is without doubt one of the most interesting conditions which come under the observation of the urinary surgeon. There are some unbelievers who doubt the truth of statements which are made as to the existence of ulcers, arguing that any cystitis is, according to the cystoscopist, an ulceration. Let it be understood, then, that in speaking of ulcer I mean a distinct necrosis—a distinct loss of tissue—an ulcer, in fact, presenting the same characters as ulcers elsewhere.

The diagnosis of ulcer is not by any means too easy, even when the object is fully in view. A shallow ulcer in a fully-distended bladder would show no dipping, no margin; but if the distension is lessened, then the flat surroundings—the sometimes raised, and at all events ragged edges, with possibly some undermining—the sunken base, with, perhaps, small sloughs attached—will soon remove all doubt. Then, on the other hand, the cup-like depression between the hypertrophied bands of the bladder of a patient who has continuously suffered from obstruction to his urinary outflow, may contain scraps of dead epithelium, and look very like a chronic ulcer. The irregular orifice of a tuberculous ureter ofter closely resembles a deep-cut ulcer. In fact, when the character of the medium, the varying refractive power of the abnormal wall, and the different distensibilities are taken into consideration, it is very evident that at times considerable experience is required before an accurate diagnosis can be made.

Ulcers in the urinary bladder may be divided into four varieties:—The simple, tubercular, syphilitic, and malignant.

Under the heading simple, I intend to include all other infections, except those very well known and important infections I have already named, and those malignants who, forgetting their ancestral progenitors, have recently been arrested on suspicion of entertaining bacteriological ideas.

Chief among these infections comes gonorrhœa. I know you will say that gonorrhœal cystitis is often seen; but where is the evidence of ulceration? Here, then, is a case in point. A young man had gonorrhœa three years ago. He has never been in good urinary health since. For the past nine months he has passed varying amounts of blood. This grew to be so troublesome that he came under treatment. He had odd patches of exfoliative cystitis, and no less than five distinct ulcers of varying depths, from some of which the blood came. In two months he was practically quite well.

Other varieties of the simple ulcer are very likely infective, but in what way or from what source it is at odd times impossible to say.

The simple ulcer is usually chronic, and mostly found in young men. It is met with in young women but rarely. Fenwick also speaks of an acute perforating ulcer, and cites a case. The simple ulcer is usually situated on the posterior wall of the bladder, towards the upper and back part. Sometimes this ulcer is solitary, with very little evidence of any trouble in the neighbouring bladder-wall. At others there may be at least two, and so situated as to give one the impression that the second was formed by infection and attrition, as it occurs at the spot which becomes opposed to the primary ulcer when the bladder is empty. In other cases there is evidence of pelvic inflammatory trouble, and at times the rupture of a pelvic abscess into the bladder. A silk ligature has on several occasions been removed from the bladder-wall, working its way by ulceration from a localised abscess round a ligatured stump. I have seen a very acutely inflamed ulcer formed

by the false passage of a silver catheter, which had perforated the bladder-wall near the orifice of the left ureter.

The cause of the solitary ulcer is difficult to ascertain. It usually occurs in young men, though I saw one case at least in a young unmarried woman of twenty-two years, and whose symptoms dated back to her eleventh year. The ulcer was as large as a shilling. Under treatment she became well in six weeks, and she continued to remain so until twelve months later. I have not seen her since.

The prominent symptoms are pain, frequency, and hæmorrhage.

The pain is usually about an inch behind the glands and on the under-surface of the penis. Pain is often localised to the seat of the ulcer, so that the patient is able to press his finger on the tender spot, or he may find that he suffers greater pain when lying on the affected side. This same ability to localise the ulcer occurs in patients suffering from tubercular ulcer, too.

Frequency is one of the earliest symptoms, and gradually increases. It occurs by night and by day, and is doubtless due to the stretching of the ulcerated surface. In some cases where, from catheterism or some other cause, cystitis has been induced, the frequency is very much more trouble-some.

It is in these cases of cystitis, too, that a new feature is introduced, namely, the occasional formation of stone by the gradual accumulation of phosphatic material on the surface of the ulcer. Cakes of this material are apparently formed and dropped off, and are passed; but there is no reason why they should not remain at times and form a nucleus for a large vesical stone. Recently a man of thirty-five years came to me in doubt as to whether he had stone or not. He gave a two years' history, with very severe cystitis for some months past. Some said that he had stone; and again, others, that there was no stone. He had been anæsthetised for the purpose of removing the stone, but as none could be found at the time, he was sent away. The cystoscope showed a stone nearly as large as a pigeon's egg, stuck fast to the bladder-wall on the left side above the left ureter. A lithotrite was introduced, and the stone picked off, crushed, and removed. It showed distinct layers, and was not wholly phosphatic.

In some cases the patient will go for some hours without passing urine, and almost immediately after the act has been completed he experiences an intense desire to micturate again, and he attempts to do so, with great straining. Usually, apparently finding the futility of this, he resists the inclination, and in a short time it wears off. This symptom is most marked when the ulcer is situated near the trigone.

The hæmorrhage is, as a rule, not very great in amount, though in one or two cases I have known a sharp bright hæmaturis to be the first indication of vesical ulcer. In the great majority some blood-staining appears at the end of micturition, or perhaps little clots may be passed which have accumulated since the previous act of micturition. In some, where the symptoms have been present for a considerable length of time, the hæmorrhage varies in quantity, but is far more plentiful.

Tubercular ulceration is probably very common. It is certainly very insidious in its onset, and frequently very slow and halting in its advance; but at the same time it is extremely difficult to say when it has been got rid of. In fact, like tubercle elsewhere, it may remain quiescent for an indefinite period, always ready to take advantage of a lowered vitality to break out afresh.

Vesical tuberculosis is practically always secondary to tubercle elsewhere. In women it is usually secondary to a like infection in the uterus or fallopian tubes. How the infection reaches this spot is a matter for speculation. At times, no doubt, a descending infection from the kidneys takes place. In

males a similar descending infection occurs, or an ascending infection from the prostate, the testis, or the vesiculæ seminales. If any doubt be experienced, an examination of these structures will often materially assist the formation of a diagnosis.

The frequently fine healthy appearance of the patient suffering from urinary or genital tuberculosis adds to the difficulty of diagnosis. The urine, too, in early cases, before the onset of cystitis, is very clear, and shows hardly any deposit on standing, so that the frequency, the incontinence, or the retention which occasionally occurs, particularly in women, as one of the initial symptoms, is set down as a hysterical matter, and is treated accordingly. At times a considerable difficulty may be experienced in deciding whether an ulcer is simple or tubercular, but usually a very fair degree of accuracy may be arrived at on the strength of a cystoscopic examination alone.

I shall now dwell for a moment on the cystoscopic appearance of ulcers. The solitary ulcer is rounded, clearly punched out, with a somewhat dirty smooth base, and with very little reaction in the surrounding tissues. It often puts me in mind of a gastric ulcer. If the ulcer be due to violence, or adjacent inflammatory conditions, the bladder-wall for some distance round is sometimes dull, tumid, and swollen. In early tubercular disease one or more superficially ulcerated patches may be seen, with a pinkish zone and little necrotic filaments attached. In addition to this, pinkish blazes showing signs of breaking down in the centre may be present.

A well-advanced tuberculous ulcer is deeply cut, somewhat sinuous in outline, with raised and undermined edges, and dull, red, angry-looking surroundings.

Tubercular ulcers are more frequently found in the neighbourhood of the ureteral orifice than are other ulcers. The reason for this is fairly obvious, inasmuch as the infection so often arrives by way of the vesiculæ seminales, or theureters in males. I have certainly found a smaller proportion of tuberculous ulcers over the posterior part of the fundus in men than in women. The difficulty in diagnosis is by no means great in bladders where the tubercular trouble is extensive. In men, particularly when there is no evidence in the genitals, and a single well-marked ulcer is found near the orifice of a ureter, repeated examination of the urine may be needed in order to clinch the diagnosis. These doubtful cases are not at all common, and diminish with the increasing experience of the cystoscopist.

The prognosis in solitary simple ulcer is usually good in those cases where the capacity for holding urine has not been seriously interfered with. In neglected and very advanced cases the ulcer may be induced to heal, but so shrunken and contracted does the cavity become, that excessive frequency or dribbling makes it necessary for the unfortunate sufferer to constantly wear a portable urinal. Some ulcers undoubtedly heal without treatment, for I have seen scars on one or two occasions in patients whose urinary history made the clinical picture fairly complete. At all events, under treatment the simple ulcer almost invariably heals.

In the early stage simple drainage by means of a soft catheter per urethram, accompanied by washing out every four hours with a saline solution or a mild antiseptic, is of great service. If to this physiological rest be added, the injection of a solution of silver nitrate of a strength from $\frac{1}{2}$ to 2 grains to the ounce twice daily, extremely good results may be obtained. If the ulcer is an old one, and deep, drainage by the perinæum (if a catheter is not well borne), with or without excision of the ulcer, is usually followed by cure in about a month's time.

The treatment of tubercular ulcer of the bladder is a somewhat more serious matter. In the first place, the general treatment with proteids, fats, and fresh air is of the greatest importance. If the ulcerative process, or

at all events the infection, is general, operative interference is apt to be followed with sad results. If the infection is more localised, then there is no doubt but that drainage and a careful and frequent washing with antiseptics, in the case of the simple ulcer, will be attended with good results. Whether a catheter or a perineal drainage tube be used, it should, and it can, be so arranged, that the end of the drain is immersed in a bowl of antiseptic at the side of the bed, and the nurse may, without any exposure of the patient, wash the bladder out, using the shaft of an ordinary glass syringe as a funnel.

No doubt some cases may get well without drainage, but my own experience goes to show that the surest, and by far the most rapid, method is by means of the physiological rest afforded by drainage, supplemented by careful, local treatment.

Syphilitic ulcer of the bladder is very uncommon, and very few cases indeed have been reported. I have seen only two. The first I have already recorded. The patient was a Jew, aged fifty-five years. He had been ill nine months, commencing with frequency, followed soon after by hæmaturia. He had no pain. There was one large ulcer, and other smaller ones. The ulcers were not very deep, and were fissured, giving them an irregular, radiate appearance. This man denied ever having suffered from syphilis in any way, but there was a well-marked scar on his penis. No local treatment was adopted; he took potassium iodide and mercury, and his bladder was perfectly healed in three weeks.

Malignant ulceration of the bladder is by no means common, and my own experience of it is small. Malignant disease of the prostate, a much more common disorder, often goes on to the bitter end without producing ulceration of the bladder-wall. In those cases where the disease is seen early, the cystoscope shows the ulcer to be deeply cut, and the edges can be felt to be hard, with a hardened base. As a rule, frequency precedes hæmorrhage, but I have seen at least one case where the first sign of any trouble was a profuse hæmorrhage, which examination showed to proceed from a nodular malignant growth near the right ureteral orifice. The patient had absolutely no other symptom. Fenwick, whose unrivalled experience must always make his opinion a weighty one, states that hæmaturia is, as a rule, not very marked, but that the formation of phosphatic incrustations is a very common feature. Certainly, the later stages make it one of the most painful of all urinary diseases. Removal may be effected if the malignant patch is seen early, and if it is situated well above the base of the bladder. The bladder may be split up with the patient in the Trendelenberg position, and free removal effected. In the very painful stages Fenwick advises section of the detrusor muscle, suprapubic transverse incision, or even section of the spinal chord.

I have in this short paper endeavoured to place before you as far as possible the results of my own observation during the past few years. Thanks to the cystoscope, these dark places are being made light, and accuracy in diagnosis is paving the way for more rational methods of treatment, so that the number of those perplexing cases which was once a reproach to our art is fast diminishing.

Above all things make your diagnosis early. Although a very shrewd guess can often be made on the strength of symptoms alone, the diagnosis can never be complete without a cystoscopic examination: nor is this of great value unless an experience, acquired by long and patient observation, guides the cystoscopist. However, should these few remarks of mine assist any of you who are interested in urinary surgery, I shall feel that I have been amply recompensed.

THE TREATMENT OF THE APPENDIX IN CASES OF APPENDICITIS WITH ABSCESS.

BY

W. Moore, M.D., M.S. (Melb.).

For some years after the treatment of appendicitis by operation was established, it was the recognised rule in cases attended with abscess to simply open and evacuate the abscess and drain; and by many surgeons this is, I believe, still held to be the correct practice. The reasons for this were:—

1. The belief that, in all cases where an abscess formed, the appendix was so destroyed that it could give rise to no further trouble.
2. The supposed safety as regards the immediate result to the patient of this procedure.
3. The great danger, through infection of the general peritoneum, attending any attempt at removal of the appendix.

It seems to me that all three of these reasons are more or less untenable, for everyone with any considerable experience in this branch of work must have met with cases where an abscess had formed and ruptured into the bowel, and yet the appendix had subsequently given rise to trouble; and he is likely to have much more frequently met with cases that had been operated on, where the abscess had simply been opened, that had suffered from relapses or that had failed to heal.

Case 1.

One such case in my practice was that of an elderly man, of somewhat broken constitution, who had a large abscess in the right iliac region. The abscess was opened and drained, and the patient made an apparently satisfactory recovery. In about twelve months another large abscess formed. This was opened, and the wound healed, but the pus re-accumulated almost at once. It was drained again, but whenever the tube was shortened pus accumulated below it, so that eventually the appendix had to be removed.

Case 2.

Another interesting case was that of a healthy young man, a first-class tennis player. He had a large abscess from an attack of appendicitis. This was opened, and he made a good recovery, except that a sinus remained, and for twelve months he suffered from accumulations of pus with pain, relieved by the escape of the pus. I dissected out the scar and removed his appendix, and obtained a cure of the ventral hernia that was already developing by suturing the muscular layers with buried silver-wire sutures. The appendix was long and large, and the accumulations of pus appeared to have taken place within the appendix itself.

Case 3.

Another instructive case was that of a young fellow who had a large abscess at the brim of the pelvis, extending well into the left side. There were no adhesions to the anterior abdominal wall, and the cæcum was strongly drawn towards the mid-line. When the large abscess had been evacuated, its inner surface presented a sloughing, ragged appearance; the appendix could not be found, though it was carefully looked for. Professor Watson saw the patient when convalescent, and made some notes in that book of his. Subsequently, in Adelaide, where the patient had gone to reside, he had another attack, and Dr. Hamilton, advised by Professor Watson and his book, operated, and easily found and removed the appendix.

Case 4.

Another very interesting case was that of a boy, æt. fourteen, who was admitted into the Melbourne Hospital on the 19th August, 1901. He was exceedingly ill; the abdomen was greatly distended. He was especially prominent in the hypogastric region, and there was dulness there. He was also very distended, tender and dull in the right hypochondriac and right lumbar regions. An opening was made in the mid-line below the umbilicus. After a little searching I opened a collection of pus above and to the right of the umbilicus, extending apparently up to the liver and downwards towards the appendix region. I now made an opening in the right side, above and mostly to the outer side of the anterior superior spine, so as to get effective drainage. Subsequently I found another large abscess situated in the pelvis, containing pus of quite a different character from that in the other collection. I made a somewhat prolonged—I was afraid a little too prolonged—search for the appendix, but failed to find it. The boy had a narrow escape, but he recovered, and was discharged on the 10th October, 1901. On December 9, 1901, he was again admitted, with evidence of appendicitis. An abscess was found, and after much trouble the appendix also, hidden away behind the cæcum and ascending colon. I removed it, and he made a good recovery.

Case 5.

Yet another of these cases. A young fellow was admitted into the Melbourne Hospital on 15th November, 1901, very ill, suffering from symptoms of appendicitis with abscess. There was also considerable general distension of the abdomen. On making an incision I found a large abscess, apparently thick-walled and well shut off from the rest of the peritoneal cavity. I therefore decided not to attempt the removal of the appendix, but simply to drain the abscess. The patient's condition improved a little, but was never quite satisfactory. The distension of the abdomen never disappeared, though at times it was very slight. At the end of a little more than a week the distension became much greater, and the condition of the patient much worse, and some obstruction of the bowel was feared. I therefore, on the 28th November, 1901, opened the abdomen in the mid-line. The presenting small intestines were greatly distended, but there was no inflammation. To get at the seat of the obstruction I now made a transverse incision from the upper part of the mid-line incision outwards to the old incision. Near the latter a small collection of pus was encountered. Adhesions of small intestines, with distinct kinking, causing, at any rate, partial obstruction, were here found. These were freed. But there was also a piece of omentum attached to the anterior abdominal wall, and through the loop thus made a piece of small intestine passed, and was constricted. The adherent piece of omentum was freed. One of the greatly-distended coils of intestine was opened, a large amount of fluid fæcal matter was evacuated, the bowel was thoroughly washed, the opening in it accurately sutured, and it was then returned to the abdomen. The appendix was found in a very damaged condition, adherent at the brim of the pelvis, and was removed. The incisions were closed with sutures, drainage being obtained from the old wound. He made an uninterrupted recovery.

These cases, taken more or less at random from my own practice, are quite sufficient to show that the appendix is far from being always a harmless relic after it has been the seat or the occasion of an abscess.

I could now give a number of cases of appendicitis with abscess in which I have followed the practice of searching for the appendix, and even with much difficulty removing it, but will only trouble you with two.

Case 6.

A young fellow was admitted into the Melbourne Hospital under my care, suffering from abdominal pains, with rise of temperature. There was some tenderness below McBurney's point, but no swelling could be detected. He was watched for some days, and as he did not get any better, and as we felt sure, although the symptoms were anything but definite, that the case must be one of appendicitis, and that there probably was a small abscess about the appendix, I opened the abdomen by separating the muscular fibres, found a clean peritoneal cavity, discovered the base of the appendix, traced the organ down into the pelvis, and in separating it, ruptured a large abscess; evacuated this, wiped it out, and then with some trouble did a regular removal of the appendix. The cavity was drained with gauze, and the patient made a good recovery. At the end of the operation a lady student asked me: "When would you remove the appendix in cases of abscess ?" I replied, perhaps not quite accurately: "Whenever I can." She seemed quite surprised, and said that they were taught that the appendix should always be left alone whenever pus was found.

Case 7.

The second case was that of a boy, æt. twelve, ill four days with pain in the right iliac region, vomiting, rise of temperature, &c. There was marked tenderness on the right side of the abdomen; there were also swelling and dulness in the right iliac region. The muscular fibres were separated. Immediately on dividing the peritoneum a large abscess was evacuated; omentum and intestinal coils formed a considerable part of its walls. After wiping out the pus I made a search for the appendix. It was situated towards the brim of the pelvis. A ligature was passed round it, and it was removed. The wound was partly sutured, a fair-sized opening being left for a drain. The boy never gave us any anxiety subsequently.

These two cases illustrate well the two classes of cases in which the surgeon may have a difficulty in deciding what he will do in reference to the appendix. In the first place those cases in which there is a collection at some distance from the incision, and free peritoneal cavity has to be passed through in order to reach the pus, which then has to pass outwards through the unaffected peritoneum. In the second place, those cases in which the antero-lateral abdominal wall forms part of the boundary-wall of the abscess, which is then opened immediately the parietal peritoneum is incised.

Now it is not easy to define the position taken up by different surgeons in regard to the question of removing the appendix in these two classes of cases.

In the "International Textbook of Surgery," edited by Warren and Gould, McBurney gives elaborate directions as to the way to reach and deal with the abscess, and subsequently with the appendix, in those cases where free peritoneum has to be traversed. He *prefers* in such cases to remove the appendix, but he says: "When the stump is thick and hard, or partially gangrenous or entirely necrosed, it may be necessary to handle it in a different manner and somewhat imperfectly. . . . . In some cases the appendix will be found so closely identified with the wall of the abscess that its removal would involve no little risk of infecting the tissues behind it, or when suppuration is abundant the operator may have been entirely unable to find the appendix. In either case it must depend upon the judgment of the operator whether it is best to insist on the removal of the appendix, no matter how difficult and prolonged the dissection, or to leave it and trust that the reparative wound-healing will render it harmless. Certainly in some cases it is much wiser and safer to leave the appendix than to insist on a dangerous and prolonged dissection. It is true that occasionally a remnant of the appendix which has been deliberately left will at a later period be the

cause of a fresh attack of appendicitis; or it may considerably prolong the healing of the wound. Nevertheless the most important consideration for the time being is the life of the patient, and it is much better to remove the appendix at a second operation, done at a favourable time, than seriously to risk the patient's survival of the first operation."

That is all very well; but if, as is frequently the case, the patient is in pretty good condition, the dissection, even if somewhat prolonged, may add but little or even nothing to the immediate danger, and it may, at that small cost of slightly-increased risk, save the patient considerable future risk. Of course, for the time being, the most important consideration is the life of the patient—no one would dispute that. What I maintain is that the life of the patient is not put to an appreciably greater risk by removing the appendix; in other words, that the danger of pushing the operation to its proper termination has been greatly overrated, and that the advantages that follow from it far outweigh the slighty-increased risk (if such really exists) that it is said to involve. However, not much fault need be found with that statement of McBurney's, though I shall certainly be surprised if it is not modified in the near future.

He goes on to speak of "the second class of cases, when a well-defined abscess lies near to and involves the anterior wall of the abdomen." After describing the method of opening such abscesses, he says: "One should search carefully with the finger for loose fæcal concretions and for the appendix itself. . . . . The greatest care should be taken not to break the wall of the abscess at an unprotected point, lest general infection of the peritoneum result. If the appendix can be readily found and removed, it should certainly be taken away. . . . . As already explained, no very prolonged search for the appendix in abscess cases, and no dangerous dissection for its removal, should be made. . . . . The only *very* important point is to give free exit to the pus, and after this has been done the less the operation is prolonged the better."

The statements here are more to be cavilled at than those previously quoted. Care should certainly be taken not to break the wall of the abscess, but if such an accident should happen, it is very questionable whether it is a matter of any importance, seeing that the pus has been already most carefully removed, and that a good gauze drain is subsequently to be inserted. Again, he speaks of *dangerous* dissection, but the important question to be decided is whether the dissection by competent hands really is dangerous, and my firm conviction is that it is not.

Senn, in a very recent work on Surgery, says: "If on opening the abdomen through the free peritoneal cavity, the abscess is found behind the cæcum, the surgeon has the choice between two procedures—(1) Packing the wound with gauze, &c.; (2) the peritoneal cavity is protected by gauze, which is allowed to remain, and the abscess is at once opened and drained. *In such cases the appendix should not be looked for, much less should attempts be made to remove it.*"

Quite recently I have in two such cases successfully removed the appendix.

In speaking of abscess cases, he further says: "If it is possible the abscess is always opened and drained by the extra-peritoneal route, reserving the removal of the diseased appendix for a secondary operation, should this become necessary by persistence of a fistulous tract or recurring attacks of pain."

Thus it will be seen that Senn takes a stronger view than McBurney in regard to the advisability in cases of abscess of not attempting to remove the appendix. There are others who take a still stronger view, and say that whenever an abscess shut off from the general peritoneal cavity is found, no attempt should be made to discover, still less to remove, the appendix.

Now, not only do I think that this latter position is quite untenable, but I wish to urge that even McBurney's much-more-advanced view is still far too conservative of the appendix. No doubt he leaves much to the discretion of the surgeon, but I feel sure that in the exercise of that discretion the surgeon is much too little disposed to search for and remove the appendix. Young children stand the shock of severe operations, especially abdominal operations, very badly, and here they are often much exhausted, and suffering severely from sepsis. Therefore, in them no doubt the surgeon will at times be wise to withhold his hand and finish the operation quickly without searching for the appendix.

In elderly, stout people the diagnosis is sometimes difficult, and the operation is therefore delayed. The patient is apt thus to come under the surgeon's hands greatly exhausted from sepsis, and with an abscess easy to open, and an appendix very difficult to find. So here, too, a quick and imperfect operation is very likely to be the wiser choice. Other exceptions may be met with where, as in Case 4, there are large abscesses, occupying a considerable part of the abdominal cavity, and where the condition of the patient is so low as to demand that as little as is necessary for the saving of the patient's life shall be done, and that little done as quickly as possible. Even here there is room for much difference of opinion, for, though very low, the patient may yet easily stand the extra injury involved by the removal of the appendix, and, in consequence of its removal, his subsequent recovery may be much more certain and much more rapid. It will also rarely happen —it has happened to me recently—and still more recently I have seen the same thing in the practice of a friend—that the abscess may, at the time the surgeon sees the case, be finding its way through the abdominal wall. In such cases not only may it be impossible to find the appendix, but the surgeon may be unable to find his way with any degree of safety into the abdominal cavity. In such a case the correct practice is to open the abscess and drain, and await events.

With these exceptions, which are really of comparatively rare occurrence, the appendix in cases of abscess should be sought for gently but diligently, and when found, removed carefully, for in these cases the collection of pus is, of course, localised, and as a rule the general condition is not very serious.

The great objection urged against dealing in this summary way with the appendix is that the danger to life is greatly increased by the risk of breaking down adhesions that shut the abscess cavity off from the unaffected abdominal cavity, and so infecting the latter. Now it seems to me that even theoretically this argument is not sound, for in the first place in many of these cases the unaffected peritoneal cavity has been opened before the abscess is reached, and the pus at the time of the operation has to be run across this unaffected region, and subsequently the abscess must be drained across it. The risk of infecting clean peritoneum is infinitely greater here than it would be by the separation of the appendix, and yet we do not regard this very seriously. Further, it surely must happen, when there is a clear, unobstructed passage through which the pus can flow out, that it will flow out along that passage, and not backwards into an occupied space, and against the pressure of the abdominal muscles. Then, in the next place, before proceeding to remove the appendix, we would have completely emptied the abscess cavity of pus, so that there would not be any free pus to rush into and infect the opened peritoneum, should it be opened by the removal of the appendix. Again, in all these cases, drainage has to be employed, and I think there is practical unanimity as to gauze packing being the best mode of drainage in such cases, and this gauze packing, if well placed, will almost with certainty prevent any subsequent infection of the peritoneum. And hence I feel sure that the increase in the risk to which the patient would be exposed by the removal of the appendix in almost all cases of appendicitis is very slight indeed.

The gain by its removal is so obvious that it is not necessary to go into that side of the question in more detail. Convalescence is likely to be more rapid and uneventful; delay in closure of the wound, and the risk of wound-complications, are reduced to a minimum. Future attacks of appendicitis are put out of the question, and with them all fear of a subsequent operation. But there is another argument not yet hinted at in favour of making it a rule always, with rare exceptions, to search for the appendix with a view to its removal, and that is the pathological fact that in many cases, in addition to the abscess first entered, generally the larger abscess, and apparently the only one, there is another smaller, but still very dangerous abscess about the appendix; and this in many cases would not be discovered unless the appendix were found. No doubt many of these abscesses burst into the track of the opened abscess, and are emptied in that way.

For these reasons I venture to think that surgeons will come more and more to regard the leaving behind of the appendix, and not its removal. as the dangerous practice, and thus in our treatment of this greatly varying and terribly destructive disease, pain and suffering will still further be reduced, and even more lives will be saved.

I scarcely care to complete this paper without a word or two on the technique of the operation, especially as I regret to say I am not quite certain yet as to my own position in regard to one or two important points. I will deal very briefly with the incision, the removal of the appendix, drainage, and the closure of the wound.

The Incision.—It should be directly over the pus collection, if the position of the abscess be at all evident, even in the mid-line if it is evident that the pus will be more accessible from there. In such cases it may be necessary also to make an incision over the normal situation of the appendix. The incision should be long enough to allow the surgeon to do his work with precision and accuracy; 2 inches may suffice, or 4 or 5 inches may be required. The smaller the incision, other things being equal, the less the risk of hernia; but, as McBurney says, the patient's life is the first consideration. In cases of abscess, should the muscular fibres be divided—that is, should a plain, straightforward incision, dividing skin, muscles, and peritoneum, all in the one direction, be made, as recommended by McBurney and others, or should the fibres be separated, as is done in removal of the appendix between attacks? I have lately been more and more inclined to adopt the latter practice, but it involves a large incision. and it does not give a nice opening for drainage. The risk of hernia should certainly be diminished by this method, especially if the drainage can be dispensed with early. Still, in one case treated in this way a hernia developed in a few months. If, when the situation of the appendix has been ascertained, enough room cannot be obtained to deal with it, a sufficient incision through the muscular fibres can then be made, either above or below the line of their separation, according to the position of the appendix.

Removal of the Appendix.—If the free peritoneal cavity is opened careful search must be made for the appendix, or for the nearest side of the abscess. Either having been found, the surgeon then will probably pack with gauze to safeguard the peritoneum. Almost all the authorities tell you to do this, and almost everyone does it. I do it, but feel that I am doing a thing that is very likely unnecessary, and not unlikely hurtful. and under these circumstances I always feel uncomfortable. As yet I cannot quite see my way clear to discard the packing off of the general cavity with gauze, though it does seem to me that the pus would inevitably flow outwards through the unobstructed passage, and not backwards, against pressure, among the contents of the already full abdomen. The abscess is then opened with the finger, or some other blunt instrument, and the pus is all evacuated. The abscess cavity should then be wiped dry with sterile gauze, and then search

should be made for the appendix. When found, another abscess may also appear. This should be dealt with in the same way. Then the appendix should be carefully separated and removed. As a rule this cannot be done in the same nice way as in the case of an appendix the seat of recurrent inflammations, and the surgeon must be satisfied with a more clumsy-looking piece of work. The vessels may sometimes be tied separately; sometimes, where the parts are thickened and matted together, a ligature is placed round appendix and vessels. The open end of the appendix should be touched with pure carbolic acid or the cautery, and, if possible, covered with peritoneum if the patient's condition is good and much time have not already been consumed. But as suppuration is already present, and drainage must be employed, there is no need to take the same care in regard to the treatment of the stump as in cases of removal of the appendix for recurring appendicitis.

Drainage.—The best method of drainage is probably by means of a fairly large rubber tube passed to the bottom of the cavity, with gauze, iodoform or sterilised, packed around it. The tube may be omitted, and simple gauze packing employed. In cases where the abscess is not very large, and it is certain that the general cavity of the peritoneum has not been opened, a drain-tube alone may be sufficient.

Closure.—If a simple incision straight through the abdominal wall has been made, it is best to close all but the opening for drainage with silver-wire sutures through the whole thickness. If the fibres have been separated, then the wound must be closed in layers, and some absorbable material—catgut, for instance—will probably be used, though silver wire may be employed.

Discussion.

Professor Watson agreed with Dr. Moore in nearly all he said. The personal equation comes in to a very large extent. Dr. Moore might remove the appendix where others could not. Dr. Moore always advised to incise over the bulge. This Dr. Watson did not agree with, *e.g.*, where that was near the mid-line. It would be better to incise, so as to keep it entraperitoneal. Again, omentum might be contaminated more easily where it was adherent near the appendix. Again, he disagreed with Dr. Moore in ever cutting the muscle. It could be separated on every occasion quite far enough.

Dr. Russell agreed with the general trend of Dr. Moore's remarks, and this especially as his experience in appendix cases grew. He had seen cases where the appendix had eventually to be removed, after repeated abscess formation. The terrors of infection from appendical pus were not nearly so dangerous as the smell would indicate—it was, with care, comparatively innocuous. He instanced a case where the appendix was pelvic in position, and a huge abscess in the pelvis, which flooded the adjacent intestines. He provided a free exit for the pus at the time by keeping the tract open with the hand, and cleaning up the soiled peritoneum afterwards. The case did well. He, however, disagreed with too frequent gauze drainage—it did not drain pus. It is, however, of great use in some kinds of peritoneal drainage.

Dr. Hinder said that as the general practitioner had very often to do this operation, it ought not to be laid down as a general rule that the appendix should be removed. Concretions ought, if possible, always to be removed. He believed in going for the bulge, because that is generally where the centre of the cavity is. He believed in dividing rather than cutting through.

Dr. Barnett instanced a case where appendix was not removed, when an abscess was opened. She suffered from recurrent appendicitis and ventral hernia. Another case, where the abscess opened into the rectum, and had had repeated attacks. Another, where patient was *in extremis*—black vomit,

appendix gangrenous, and concretions. He removed the appendix and concretions, and opened up the pockets of pus, and the patient recovered. With regard to the muco-pus secreting remnant of an appendix, he suggested that such might be tubercular.

Mr. Syme said that in his first paper on the subject, more than ten years ago, he had maintained that the appendix should always be removed if possible; and that had always been his practice. In many cases, however, the appendix was so firmly fixed and buried away in unusual positions, that it was hardly possible to remove it, and it was often very difficult. In these cases the personal equation must come in, and he quite agreed with Mr. Hinder that, except in skilled hands, the main object of saving the patient life would be best achieved by simply opening and draining. As to technique, he had for some time invariably performed McBurney's muscle-splitting method in all cases, extending the incision where necessary, sometimes by cutting the muscle fibres, more often in the manner described by Prof. Watson. As to the position of the incision, he agreed with Dr. Moore, but preferred to make it a little to the iliac side of the swelling, which was often caused by thickening omentum. As to gauze-packing, like Dr. Moore, he was in some doubt, and was not satisfied that the healthy peritoneum could be opened up with impunity in these cases. He thought it advisable, and invariably endeavoured to secure, that the whole field of operation should be protected from contamination and irritation, and he covered the adjacent skin, the edges of the incision, and the abscess-wall with sterile gauze wet with sterile saline solution. He agreed with Mr. Russell that gauze was not a good drain for pus, and used a tube. But when the appendix was removed, and all pockets and secondary abscesses opened and cleaned out, the discharge subsequent to operation was seldom purulent to any extent.

Dr. Moore, in reply, said he was not saying that a country practitioner, without help, should not be content with opening the abscess. He was merely advocating what he considered should be their ideal. The midline was sometimes certainly the best site for opening and draining the abscess. In difficult cases it was impossible to do without cutting some muscle fibres. Another reason for dividing some of the fibres was to secure a more efficient opening for the drainage. With regard to walling off the cavity in operating, he was doubtful as to its benefit, as he had stated in the paper.

SOME POINTS IN NEPHRECTOMY.

BY

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Is there anything more marked in the surgeon's work of the last twenty years than the fact that he who would command success must be as much a man of science as one possessing manipulative dexterity? In no branch of surgery is this more manifest than in that which deals with the urinary apparatus. With how much trepidation for the welfare of the patient was the operation of nephrectomy undertaken in only recent years, till the experiments of Professor Rose Bradford made our minds at ease, by furnishing us with the proof that one-third of the kidney weight was in itself sufficient for the excretion of urinary solids and fluids from the body, the while being consistent in other directions with the maintenance of perfect health of mind and body. His experiments were made on dogs, but the daily accumulating evidence makes it more plain that the conclusions he arrived at are applicable to the human individual.

When one looks at his bookcase, and sees before him the last edition of Mr. Henry Morris' work on "Surgical Diseases of the Kidneys," it makes him dubious about writing anything upon the subject. The information accumulated within those covers, both personally and by reference to other workers, is so great, that it leaves almost nothing to be desired.

Yet, in our congresses the personal view of even the humblest may be of service in opening a discussion, from which may be derived information that may be of use at a critical moment. The greatness of the advance in this branch of surgery may be estimated at a glance by comparing the sizes of the last two editions of the book just referred to.

To reach the kidney by an incision, the lumbar route was, until recent years, almost exclusively used; now one thinks of the oblique lumbo-inguinal, or the transperitoneal from the anterior abdominal wall. The former is the one of election, and it is that with which these observations solely deal. The avoidance of injury to the twelfth dorsal nerve, and the finding of the lumbar fascia where the knife can be passed through it in almost absolute safety, constitute the only points of importance in the incision proper. The striking feature in the appearance of the healed wound of the present day, is the relation it bears to the iliac crest and Poupart's ligament. Until lately it did not approach the latter, and it was at right angles to the former. Every practical surgeon knows how much greater is the facility he has for dealing with the kidney and adjacent areas, by the alteration in the direction along the body's surface in which he first applies his knife. The enlarging of the deepest part of the incision with the pushing aside of the adjacent peritoneal reflection, the colon, and the fat, are matters of but a few moments. At this stage an important consideration always presents itself to me: What is the level of the kidney in regard to the other structures? It would appear that in different individuals the variation is somewhat considerable. Whether it lies nestled high up under the liver or the diaphragm? Whether it approaches nearer to the spinal column than the anatomical description suggests? Or whether it lies immediately beneath one's incision and is ready to hand? To the beginner in renal surgery here is to be found the seat of his greatest difficulty. Wherever it lies, once it has been decided where the kidney is, the snipping of the posterior layer of the transversalis fascia, and opening the proper fatty capsule of a delicate pink tint, differing in this from any fatty tissue in the body, its bluish surface is immediately recognisable. This is an anatomical condition that does not exist

in gross pathological lesions, but it is a well-recognised entity in cases of small calculi, diseases of the papillæ, or the increased vascular engorgement or tension. Mr. Hurry Fenwick has done some excellent work on the second, and Mr. Reginald Harrison equally deserving work on the third of these affections. The question of the correctness of diagnosis and of justification for operation are now in view. When this has been decided by the finding of a serious injury, a tuberculous condition, multiple abscesses or one large abscess, a tumour of the simple semi-malignant or malignant type, a large stone which has distended the main channel of the renal pelvis and is growing out into the calyces, the question arises: What had best be done in the interests of the patient? Can a definite rule be laid down for our guidance? In some cases, Yes. But these are the minority, and include malignancy and injuries which involve the whole of the kidney tissue. That which is likely to give most concern is the calculous condition. With a small stone there is no alteration of kidney tissue, and the incision along which it is removed heals with rapidity. But with large branching calculi it is far otherwise. They have been lodged for years in the kidney pelvis; they have grown, pushing by more and more into the adjacent calyces, and distending the main sac; not alone this, but they press back the points of the papillæ, block the main tubes which open on them, and disorganise the secreting and conducting structures up to the glomeruli; and this, too, with or without an apparent enlargement of the organ, but certainly with a thickened and sodden condition of the tissues of the wall of the pelvis, which allows it to break down under pressure from the fingers wherever there is a projecting point. All this may take place without a fluid distension of the renal pelvis, if the stone be not blocking the ureteral opening of the sac. It may also progress, and the urine remain acid, though this contain in plenty red and white blood cells, and even palpable masses of these. If one remove the stone and leave a kidney in this condition, it is more than likely a sinus will persist, and bring discredit both on the operation and the operator. The knowledge of the state of the excretion from the other kidney becomes here of paramount importance. We are deeply indebted to Mr. Hurry Fenwick, of London, and Howard Kelly, of Baltimore, for placing us in possession of means whereby we can determine the condition of the urine flowing from the ureters into the bladder. Few objects can be more pleasing to the eye in search of an accurate diagnosis than two jets of urine issuing from the ureteral papillæ into clear boracic solution, the one containing flakes that swirl upwards, the other nothing but the eddies of the normal fluid. Such can be viewed with the utmost precision by the cystoscope.

When we have decided that the kidney is to be removed, there will be little difficulty if it has been possible to bring the organ outside the incision. This manœuvre is dependent for its performance upon the length of the tissues which are attached to the hilum of the kidney. In healthy anatomical states these appear to vary greatly, but in diseased conditions, it is probable, that the number of kidneys which can be brought on to the abdominal wall is diminished. The large pressure forceps which are now available, enable us to effectually control hæmorrhage while we remove the diseased organ, and the needles for passing silk afford us the utmost facility for the introduction of ligatures beyond the seat of the pressure forceps.

There have been few moments in practice when the wish for more precise knowledge has been uppermost, than when, standing over an exposed kidney from which a large branching calculus has been removed, the consideration arises: Should this organ be returned and drained or removed? Whether the incision has been made by design and along the convex border of the kidney, or by necessity through the posterior wall of the pelvis, the result is nearly the same, a large and gaping wound through the thickened and altered tissues, exposing not only the main space of the sac, but also

as many of the calyces as have been encroached upon. Were one in the position of having a skilled pathologist at his elbow, to whom he could hand a small piece for immediate microscopic examination, he might wait for a few minutes to learn if the tubular structure has been so altered, and the glomeruli to such an extent put out of action, as to render the kidney of little use for its excreting purposes. With our limited population, and consequently hampered means, it is not probable that we shall be, even in our best-equipped hospitals, at such a stage of perfection for some time to come. A thorough knowledge of the macroscopic, and in this I include viewing the fluid with a cystoscope as it issues from the ureters, into the bladder, the chemical and the microscopic characters of the urine excreted by the patient anterior to the operation, will help one. The means at our command are sufficient to enable us with a little care to arrive at a fairly accurate estimate of the condition of the fluid as it leaves the kidney, both in male and female cases. Such a knowledge will aid much, at the time when the best action to be taken in the interest of the patient has to be decided without delay. A dominant note, even in Morris's book, when this subject is being dealt with, is that the kidney should not be removed if there be even a remote chance of its subserving a useful function in the future. My mind holds a doubt, whether a wounded kidney exercises an effect which is not good upon the opposite kidney in the body, and it has been much exercised in this direction by a case with which I had to deal. A large stone was removed; progress was not good owing to an attack of phlebitis in the leg on the opposite side of the body; healing of the wound in the kidney did not progress satisfactorily; a sinus was the result. The amount of urine passed, including that lost along the sinus, was not up to the ordinary standard—for the first forty-eight hours after the operation only 8 ozs. passed through the bladder. After a time a second operation was performed, and the kidney tissue as it stood was entirely removed. Within forty-eight hours the patient began to improve visibly; the amount of urine passed by the bladder at once ran up to 40 ozs.; his leg, the subject of the vein obstruction, took on a rapid improvement; he began to put on flesh; and in the course of two weeks he was a new man. That one healthy kidney is quite capable of performing all the work of the body is evident from the knowledge now to our hand. That it does it better in the absence of a diseased fellow this case suggests. A microscopic examination of the kidney removed exhibited a condition of the tubules and of the glomeruli which pointed to its being not of much use as an excreting organ. This brings to mind scientific problems in another direction, but which should have the same practical result as those which have been so ably presented to the profession by Professor Rose Bradford.

Discussion.

Dr. Hinder said that nephrectomy is performed probably too often. He was more conservative than usual, perhaps, in regard to this operation—as a rule one has absolutely no kidney tissue to spare. Tubercular kidneys afforded perhaps a more frequent cause for removal. The cystoscope afforded no absolute certainty as to which was diseased. He instanced a case where the kidney was almost completely severed by injury. He had stitched it together, and recovery resulted. Personally he thought that a kidney should never be removed if possibly it could be avoided.

Dr. Moore instanced a case where, after removal of a large stone from the left kidney—and subsequently from the bladder several small stones—the patient continued to be very weak and ill. The right kidney was then explored; a large collection of blood and pus removed. The whole of the urine came through the lumbar wound, showing that the right kidney, which

at the operation appeared to be very much thinned out, was doing all the secretion, and therefore that a patient could exist on a limited amount of kidney tissue. A stone impacted in the left ureter eventually passed. However, he agreed with the main conclusion, viz.: that the kidney should be removed as seldom as possible.

Reply.—Of a set purpose my paper did not obtrude my own cases upon the Section. In reply to the remarks of Dr. Hinder, it is well known that the common cause of a persisting sinus is the failure at the time of operation to remove the whole of calculus material. It should be possible, with a careful review of a case, and the use of the methods now ready to our hand, to arrive at a fairly accurate opinion as to the state of the excretion from each kidney, and thus of the state of health of either organ.

In reply to Dr. Syme, the experiments of Professor Rose Bradford have shown that with one-third of the kidney weight in active work, there is sufficient renal tissue to remove both the fluids and solids from the blood, while at the same time it is consistent with a vigorous carrying on of the other needs of the economy. In the case he quoted, there must have remained in active work that amount of the tissue which was necessary for the individual concerned.

THE USE OF THE DOUBLE THOMAS SPLINT FOR DISEASE OF THE HIP-JOINT.

BY

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THE fact that the ordinary form of Thomas splint, that is, the single splint, is associated with the use of crutches, enabling the patient to go about when wearing it, has caused the great value of the double Thomas splint, which of course precludes the use of crutches, to be too often overlooked.

It should be remembered that the claims of the single Thomas splint to superiority over all other mechancial forms of treatment of morbus coxæ rest not only on the fact that the patient wearing it may use crutches, but also on the fact that it fixes the point better than any other splint that has been devised for the purpose. It possesses a third great advantage over other splints in that it allows the surgeon to gradually alter the position of the limb without removing the splint at all during the course of treatment.

Of these three advantages, the most valuable is that of keeping the joint fixed; and in this respect the double Thomas is still better than the single, and far excels any other method, short of encasing the patient in plaster of Paris, a proceeding which is for many reasons unsuitable.

The single Thomas splint is not easy of management in all cases, especially those where the deformity has become considerable before beginning treatment. The double one, on the other hand, is very easy to manage, and for those who have not had the opportunity of acquiring skill in the use of the single splint, the double one will not only be better for the patient, but will serve to give the skill and confidence in the use of the single splint which will be necessary at a later stage.

In the majority of cases one does not feel justified in giving the patient crutches at first; nearly always there must be some time spent in bed, and though a single splint may serve very well during that time, a double one will be in every respect better—it will ensure a greater degree of fixation to the joint, it will give quicker relief from pain, and more perfect rest to muscles which have been for some time in a condition of over-tension, and it will more quickly enable the muscular contraction to be overcome, so that the patient will be ready for crutches in a shorter time than if he had been treated on a single splint; and when that time arrives the double splint can easily be made single, by knocking off the stem which corresponds to the sound limb. But my own experience in the matter has been that the more I make use of the double splint, the less anxious I am to hurry towards the use of crutches. Provided that the patient can be placed in a long perambulator and allowed to lie in the open air for the greater part of the day, active exercise on crutches will not be needed, but the general health will improve rapidly under the condition of perfect rest to the diseased part thus obtained.

The cases in which a double splint is better than a single one may be divided into three groups:—

The first includes all children too young, too weak, too venturesome, or too unruly to be trusted on crutches. The second includes all cases where pain is very great; the third, all

those where there is a marked deformity, without bony anchylosis. And here parenthetically it may be stated that even in bony anchylosis, if not too dense, the deformity may be corrected by a prolonged and judicious use of Thomas splint—with an ultimate result better than that obtained by operative measures.

Let us suppose that a child aged five or six years is brought for treatment, suffering from well-marked hip-disease. Setting aside the consideration of other symptoms, the hip-joint will be flexed perhaps to nearly a right angle, and in order to walk the patient is obliged to throw the lumbar spine into a position of marked lordosis, with lateral curvature, according to the amount of abduction, or abduction of the thigh.

If the child is laid on its back on a level table, the flexion at the hip-joint will become very apparent, and every attempt to correct it will only result in arching of the lumbar spine. As the knee is raised again the lordosis will disappear, and the spinous processes of the lumbar vertebræ will touch the table. The weight of the limb makes this a difficult position for the child to maintain. It will therefore tend to lie on the sound side, resting the knee of the affected limb on the other. All the muscles which act on the hip-joint will be on guard, holding the joint in the position of greatest ease, and endeavouring to prevent any sudden movement. But this is a very imperfect condition of fixation, and is disturbed by any jar or knock, and when the patient falls asleep the tired muscles relax, the joint moves, the muscles start into action again, and the patient gives the night-scream so characteristic of the disease.

Nature thus gives us the hint to substitute some more or less rigid mechanical contrivance for the complicated muscular mechanism that is endeavouring with poor success to keep the joint at rest. Nothing is so efficacious for this purpose as a well-fitting double Thomas splint, which, when properly applied, will hold the lower part of the spine, the pelvis, and both thighs quite firmly, so that there can be neither autero-posterior, lateral, nor rotary movement in the hip-joints. A single Thomas splint would prevent autero-posterior movement just as well as a double one, but it would not prevent a certain amount of lateral or rotatory movement so effectively, since we are supposed to be dealing with a case in which there is a great amount of flexion, and unless the leg were well supported by pillows and constantly watched, its weight would tend to drag the splint out of place. Great care would have to be taken, too, in lifting the patient about, so as not to disturb the position of the splint; whereas with a double Thomas splint the child can be lifted about, laid down, and left lying for a long time, without any necessity for special skill on the part of whoever is nursing him.

The double Thomas splint must be made with at least one of its stems flexed to whatever angle the diseased limb has assumed; and until such time as the flexion is corrected this splint is really an inclined plane, supporting the leg in the position which has been assumed to ease the pain caused by the tension in the inflamed part.

It may be argued that it is an inclined plane without extension, and that the chief value of the inclined plane is to permit of extension being efficaciously applied. I grant that an ordinary inclined plane is not of much use without an extension apparatus, but that is simply because the ordinary inclined plane does not fix the joint; whereas the extension apparatus, with its weight, acting over a pulley, does prevent sudden muscular contraction, and maintains a condition of comparative rest in the inflamed structure. A double Thomas does all, and more than, an inclined plane and an extension apparatus can do. It relieves pain and muscular spasm at once by giving absolute fixity to the joint, while allowing the deformity to be gradually corrected by the surgeon, who can from time to time alter the curves of the splint with suitable wrenches. It enables the child to

be easily, safely, and painlessly carried about, or to be placed in a long perambulator, and to be kept all day in the open air; it makes the nursing of the child much easier; there is not the same necessity for constant supervision of the apparatus, and the child can be nursed at home by the mother. This is a matter of some moment in hospital cases, for not only do these cases do better out of the hospital wards, but it is a severe tax on the accommodation of most hospitals to fill the beds with hip cases.

Let us take another suppositious case in which the disease is not so far advanced, and flexion is so slight that it may practically be disregarded. Such a case is very often treated with a double Bryant splint; but the double Bryant, no matter how firmly it be applied, is not to be compared with the double Thomas as a means of keeping the joint in good position. What is wanted is an apparatus which will enable the patient to be lifted and carried out into the open air without disturbing the joint in the slightest degree. When the patient who wears a double Bryant is moved to be washed or cleaned, or to have his bandages fixed, or to be lifted out of his bed, a certain amount of falling back of the buttocks and consequent flexion of the hip-joints must take place; whereas the patient who lies in a double Thomas splint, even if all the bandages are removed, can be washed and cleaned and lifted without the slightest possibility of the buttocks sinking back, because the support of the splints is behind the joints, and not at the side. I believe that Thomas' splints, both single and double, would be used even more than they are were it not for the supposed difficulty in getting them measured and made, and many a patient is treated with another form of splint because he cannot go to an instrument-maker. As a matter of fact, it is exceedingly easy to measure a patient for a Thomas splint, and, provided the surgeon really knows what measurements to give, he can get any bush blacksmith to make the iron frame, and any bootmaker or saddler can cover it with basil or soft leather, and the result will be as good a splint as any instrument-maker could turn out—indeed, a great deal better than many good instrument-makers will supply, for most of these tradesmen have quite wrong ideas of what a Thomas splint should be. I have seen beautifully-finished splints made with almost every possible fault; for instance, the stems of springy steel, with a lordosis curve, and without any rotation at all. Now some of the essential points of Thomas splints are that there shall be no springs in the iron used; that it shall be strong enough to resist bending by the patient's weight or strength, malleable enough to be easily bent with suitable wrenches, and not so heavy as to make an unwieldly splint. There *never* should be a lordosis curve in the stems, no matter how great the flexion; and in order that the flat of the stems should be applied to the back above, and to the thigh and leg below, it is necessary always to have the stems rotated on their own axis outwards through 45°, from the top of the buttock-curve. When abduction or adduction is very marked, a little more or less rotation will be requisite. It is most important, particularly if the child is to be treated in its own home, and without a skilled nurse, that the splint should fit perfectly from the very first, and that it be applied in the position which gives ease from pain at once. If the mother finds that the child lies comfortably in its splint, that it can be easily moved without causing pain, that it sleeps without starting up and crying out, and that it is less fretful than before the splint was applied, she will at once appreciate the good that is being done, and will do all she can to carry out the surgeon's wishes; but if the splint is a misfit, and the child is uncomfortable, and still has pain, and gets sores on the skin from unequal pressure of parts of the splint, she will have no confidence in the treatment, and when, at the next visit, she sees the wrenches being applied to bend and twist the splint, she will think

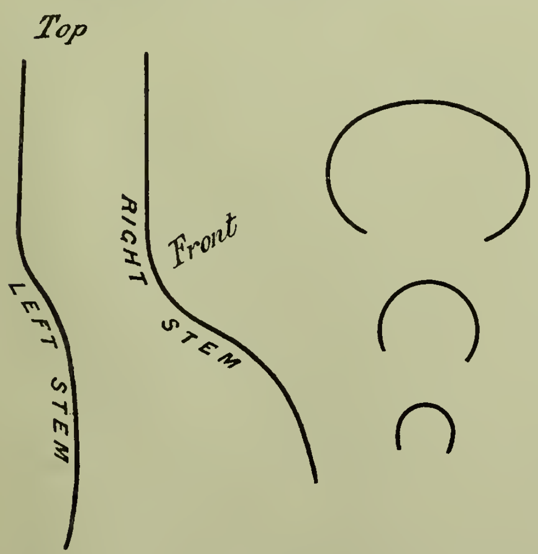
the child is being tortured, and will very likely take the splint off when she gets home, and leave the child without treatment until the disease gets very much worse.

The method of measuring which I always follow is this:—Having got a pencil, a large sheet of paper about 3 feet by 2 feet, a tape measure, two strips of lead about $\frac{1}{2}$ inch wide and $\frac{1}{8}$ inch thick, one about 3 feet long and one about 15 inches long, I have the patient stripped and laid upon a table over which is placed a folded blanket. This is preferable to any soft couch. The patient is turned on to his sound side, a very small cushion or roll of cloth is placed under the cheek, of sufficient height to keep the cervical vertebræ in the same horizontal line as the rest of the vertebral column. The elbows are kept close to the sides, the shoulders and pelvis squared; both knees are drawn up until the lordosis curve disappears from the spine. The knee of the affected limb rests on that of the sound side, and the patient is steadied in that position by the mother, who faces the patient, with one hand lightly laid on the upper shoulder, the other hand supporting the upper knee. In this position the patient is quite comfortable, and the measurements are more easily made than in the standing position. Keeping the elbows close to the side brings the angles of the scapulæ to their lowest position, half an inch below which the chest-band of the splint should encircle the chest.

Having put the patient into this position, I mark with a pencil a line across the back, half an inch below the angles of the scapulæ, and a line across the back of each leg, at its lower third. The distance between the upper and lower marks is then measured with a tape measure pressed closely against the back and limb. This gives the length of the stem, and must be written on the large sheet of paper provided for the pattern. The circumference of the chest at the level of the pencil-mark is then measured, and the distance between the nipple-lines in front deducted. This gives the length of the chest-band. Three-quarters of the circumference of the calf is then measured and noted for the leg-band, and three-quarters of the circumference of the thigh for the thigh-band. This thigh-band should be placed about an inch below the fold of the buttock, but it must be placed lower if there is much flexion, otherwise the inner part of it will press against the pubes; if an abscess is forming, or if a sinus is present, the band must be placed so as not to press on them. The distance from the top at which the thigh-band is to join should be measured and noted. There is one more measurement to be taken, and a most important one; that is, the distance between the posterior superior spinous processes of the iliac crests. This distance must always be left clear between the stems, where they join the chest-band; otherwise there will be a pressure on the bony prominences, and pressure-sores will result. The next step is to draw the pattern of the splint required. This is done by pressing a strip of soft lead against the patient's body from the angle of the scapula to the calf, closely following the curve of the buttock, placing the lead carefully edgeways on the sheet of paper, and tracing the curve of it with a pencil. The same is done for the other side, unless it is intended to place both limbs at the same angle, and the curves are the same. The outline of the chest is then taken with a short strip of lead in the same manner—first one half of the chest and then the other. In tracing these curves on the paper it is always necessary to slightly deepen the curve at the centre of the back; otherwise the skin over the spinous processes will be rubbed, and a pressure-sore will result. The outlines of the thigh and calf-bands are taken in the same way. The pattern and measurements having been put on the paper, the next step

is to state the thickness of iron which is to be used in each part; otherwise the blacksmith may make the splint either too light to be of use or too heavy for convenience. Children of different ages require splints of different strength. Dr. P. B. Bennie, of Melbourne, whose systematic advocacy and scientific use of Thomas' splints has so greatly influenced the treatment of hip-disease in the Melbourne Children's Hospital, and to whom for his teaching in this subject I take this opportunity of expressing my own indebtedness, has devised a list of measurements of the sizes of iron suitable for children from one year upwards. The measurements go into fractions of the thirty-second part of an inch, and as many blacksmiths have not got all the different sizes of iron, and as for a double Thomas splint extreme lightness is not essential, as it is in a single one, which the patient will have to carry about, I have adopted a modification of his measurements, which I always use now, and find simple and satisfactory. For children under five years, iron of $\frac{1}{2}$ x $\frac{1}{8}$ inch thick is used throughout; from five to eight years, the stems and chest-bands are of $\frac{5}{8}$ x $\frac{1}{8}$ inch iron, the leg-bands of $\frac{1}{2}$ x $\frac{1}{8}$; from eight to twelve years, the stems are of $\frac{3}{4}$ x $\frac{3}{16}$ iron, the chest-bands of 1 x $\frac{1}{8}$, and leg-bands of $\frac{1}{2}$ x $\frac{1}{8}$; from twelve to fifteen years, the stems are of $\frac{7}{8}$ x $\frac{3}{16}$ iron, chest-bands 1 x $\frac{1}{8}$, leg-bands $\frac{1}{2}$ x $\frac{1}{8}$. The question will arise in every case whether or not should the stems be joined at the lower end. In most cases it will be better to joint them. The splint will thus be made more rigid, and the patient can be lifted more easily; but if there is much deformity, especially if there is much adduction, the stems cannot be joined below. That for the sound leg must then be fitted to the leg in the position of full extension; the other will be gradually brought to its proper position by altering the stem with the wrenches. In such cases the double Thomas' splint is of the greatest possible service; the sound leg being fixed to its own stem gives such resistance that the stem on the diseased side can act to far better advantage than when (as in a single splint) the only purchase is obtained from the yielding walls of a little child's thorax.

The paper as supplied to the blacksmith will be something like this:—



Stems 28 × $\frac{3}{4}$ × $\frac{3}{16}$ inches.

Chest band 18 × 1 × $\frac{1}{8}$ in.

Thigh 8 × $\frac{1}{2}$ × $\frac{1}{8}$ in.

Calf band 4 × $\frac{1}{2}$ × $\frac{1}{8}$ in.

Stems to be $2\frac{3}{4}$ inches clear apart where joining chest wing. To diverge to 5 inches at lower end. Lower end not to be joined, as stems are of different curves.

Thigh wings to join at 16 inches from top.

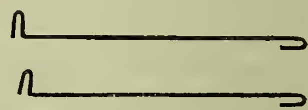
Stems to be rotated outwards, each through 45 degrees from the top of the buttock curve.

Double Thomas Splint for A.B.

Before getting the splint covered it should be tried on. If there has been any mistake it is easily rectified at this stage; making alterations later may destroy the leather. The chest-band should always be opened out with the wrenches, not with the hands; opening them out with the hands always straightens the curve in the back of the chest-wing. The covering should be basil, with the smooth side outwards; no padding at all is required.

Braces will be necessary to keep the splint from slipping down. Two pieces of webbing 1 inch wide should be sewn to the middle of the chest-band, their ends brought across either shoulder and fastened to buckles attached one at each end of the chest-band.

Two wrenches are required and should be of round $\frac{1}{2}$-inch steel at least 2 feet long, with a longitudinal claw at one end and a transverse claw at the other, thus—



A goniometer should always be kept at hand to measure the angle of flexion, and to enable one to estimate the improvement in position from week to week.

THE OPERATIVE TREATMENT OF ENLARGED PROSTATE

BY

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Before entering upon a discussion on the different methods adopted for the relief of enlarged prostate, it would be as well if I were to endeavour to indicate why operative treatment is needed at all. There are some who assert that prostatic patients are well able to get along very comfortably with the help of a catheter; that this is all they need; and that operative measures show a *furor secandi* which is greatly to be deprecated.

It is urged that very few, if any, men die of enlarged prostate. This is not to be denied, but it is none the less true that very many men die of the pathological sequences excited by that enlargement. As a rule the actual increase in size is of very little importance, but the dangerous factor is undoubtedly the amount of obstruction to the urinary outflow, the amount of residual urine present, the amount of backward pressure on the whole urinary system. How much residual urine—that is to say, how much backward pressure—is necessary to upset the urinary economy it is hard to say. Doubtless some compensation is made, but beyond a certain point the backward pressure invariably produces grave changes in the bladder, in the ureter, in the pelvis of the kidney, back to the ultimate cells where the process of excretion takes place. As a result of this an insidious form of interstitial nephritis is set up, accompanied by a copious excretion of low specific gravity urine, which necesitates frequency of micturition, and is associated with such a sensitive condition of the urethra that the mere passing of a catheter becomes a surgical operation to be dreaded.

My own experience induces me to hold with the views expressed by Mansell Moullin to the effect that the urine in the urinary bladder is almost invariably aseptic until instruments, and presumably organisms, have been introduced. The mere passing of a catheter, then, for the first time in an old man must be regarded as an operation which involves a very grave responsibility on the part of his medical attendant. In discussing the treatment with the patient and his friends as to whether operation for the removal of the obstruction or the adoption of the so-called palliative treatment be recommended, this fact should never be lost sight of.

If the introduction of catheterism is successful, and the patient does become immune to certain septic doses, so that, in fact, he may, as I have seen, expectorate on the catheter, and pass it without harm to himself, he still is apt to suffer from chronic catarrh of the bladder and numerous other ills which frequently accompany the varying degrees of chronic cystitis. The whole matter probably depends on the two main factors—the amount of residual urine and the resisting power of the bladder to septic processes.

A complete removal of the obstruction to urination, a complete restoration of the power of the bladder to completely empty itself, is the result to be aimed at in any operative procedure. We must not set out necessarily to remove the prostate, but to restore normal urination.

Every case is a law unto itself, and the surgery of the prostate would advance more rapidly if, instead of men endeavouring to force their own particular method in every case, or wrangling over a matter of precedence, they were to unostenatiously do the work for its own sake, content to see that they were able to relieve a suffering fellow-creature. It is with all due

modesty I can assure you that I shall attempt to indicate what methods are most suited to the different cases with which one usually comes in contact.

Surgical interference has so far endeavoured to bring about a reduction in the size of the gland, either by attacking the gland itself, or in a more indirect fashion by removing the testes or portion of the vasa deferentia. The operations of orchectomy and vasectomy probably produce the same result. They will undoubtedly bring about a diminution in the congestion and irritability of an enlarged prostate, and also produce a certain amount of shrinkage; but even if they do this, it does not necessarily follow that the bladder is more capable of being emptied than it was before. I have performed both operations without any apparent benefit, simply because the cases were not suitable. Where a severe operation is contra-indicated, and where there is a considerable amount of irritability about the neck of the bladder, much benefit may be derived, and again also in those cases where the patient is old, the residual urine small in amount, and much irritability and frequency are present, almost normal urination may be secured.

Post operative insanity, which is said to follow vasectomy, and particularge orchectomy, is, I believe, not so much due to the nature of the operation as to the fact that an operation has been performed; in fact, that any other operation which confined a feeble old man to his bed for many days would probably produce the same result. There is no reason why any old man should be confined to his bed for more than four days after either operation. It is as well to remember that orchectomy destroys the ability to procreate, and usually destroys the desire as well. Vasectomy destroys the ability, but rarely the desire. The mere presence of an enlarged prostate is sometimes accompanied by a loss of the desire to procreate, and removal of the obstruction is at times followed by a restoration.

Even if orchectomy were completely satisfactory, there are many who would die rather than submit to the mutilation.

The suprapubic method may include a complete removal of the whole gland, or, at all events, all of it that is anatomically possible to remove; or it may include the removal of the obstructing part only.

If the prostate is large and bossy, then the enucleation of these bosses, made up, usually, of adenoid tissue, is a safe, fairly easy, and satisfactory method to adopt; but if there is merely a nodular outgrowth, which, though it be small, is still sufficient to bring about an absolute retention, then removal of the nodule, and cutting away so as to leave a low-level channel running well into the prostatic urethra, will allow the patient to completely empty his bladder.

It might be stated that there is no reason why this removal should allow a free channel to remain persistently. In some of my cases it has lasted for six years, and in no case have I yet found a recurrence. This is probably due to the fact that the cases operated on were selected cases—that is to say, those in which either a nodule was present, or the prostate was enlarged in such a way as to lengthen the prostatic urethra by means of a portion of the prostate spreading up in a wedgelike fashion, the apex being superior. This method would hardly suit a massive, bossy prostate, as it would necessitate more free cutting away than would be advisable.

If the urine is clean, or if it is easy to pass a catheter, even when the urine is septic drainage by means of a tube placed suprapubically, and washing through the bladder by means of a catheter may be sufficient to bring about a recovery; but I think there can be little doubt but that perineal drainage with a suitable tube, combined with frequent washing out through this tube, will keep the septic bladder under better control than any other method. There is this to be said against perineal cystotomy, however: it is very often followed by an annoying hæmorrhage, which is sufficiently severe to make it necessary to plug the wound for a few days.

The prostate is sometimes attacked through the perinæum, usually by a transverse incision. Whether it is unilateral, bilateral, or semilunar, matters little. When the cut has been made an inch deep the fingers can very easily do the rest, and the prostate or the adenomatous masses are enucleated. As a routine operation this method must often fail, for it cannot be possible to remove a pedunculated nodule in this way unless the bladder is opened. It may answer in those enlargements where the increase is massive and confined to the posterior, and perhaps the lateral part, but a great deal must be left to chance.

The combined method implies that a suprapubic incision has also been made, and the prostate is pressed down into the perinæum with one hand while the other hand enucleates by means of a perineal incision.

This is much more satisfactory, and a large prostate can be removed with a fair amount of ease and some certainty that the urethra is left free; but inasmuch as a very large percentage of prostatic obstructions are caused by a pathological middle-lobe nodule, this can as easily be removed without the aid of a perineal incision, for I have certainly seen residual urine to the extent of 8 ozs. occasioned by a middle lobe very little larger than a pea.

A simple median perineal cystotomy and drainage is said to reduce the size of the prostate, and to leave a clear urinary track when the perineal wound closes. I performed this operation once in conjunction with vasectomy in an old man of seventy, who was suffering from complete retention, which had finally become absolute. He was much deformed with rheumatoid urethritis, so that it was with difficulty that one could get at his bladder from any direction. He made a perfect recovery, and has had no residual urine since. Two other cases treated by perineal drain only improved, but were by no means perfectly restored. We must regard this method as one suitable in cases where the prostate is not too large, and particularly in septic bladders requiring free drainage, and also in those cases where more severe measures are precluded owing to general or local conditions present. Portions of the prostate have been removed by means of a perineal cystotomy incision, but the method can hardly be recommended except, perhaps, in those cases where a cystoscope examination shows an isolated nodule, which may be removed in this way.

Instruments have been devised for removing the outgrowth through a cystotomy wound, but the method, although possibly satisfactory if a middle-lobe nodule is present, gives one all the risks of incision, and removal of a growth out of sight, and somewhat out of touch, too, in fat patients, without a corresponding amount of certainty of success. A suprapubic cystotomy would be easier, and allow of a more certain removal.

The free incision of the prostate through the urethra by means of a concealed galvano-cautery platinum blade is an operation which is greatly coming into favour. I am afraid that its exponents are rather apt to destroy its reputation by applying it to every form of enlarged prostate. The fatalities have been due to secondary hæmorrhage, to the retention of blood clots which have become septic, or to necrotic masses of gland tissue. Any other deaths recorded have been due to faulty manipulation, and were by no means to be laid at the door of the operation itself.

My own impression is that it would be most suitable in early cases, and in moderately enlarged prostates. I feel quite sure that the risks would be very great in a very large prostate—much greater than the operation by enucleation would demand. Prostates which require a cut of 1 inch or less in depth are the most suitable.

It is often best not to do too much in one sitting. I operated on one old man of eighty-three, who had 12 ozs. of residual urine. A week after there were but 2 ozs. In two other early cases the result was perfect. Usually the constitutional disturbance is very slight, and the patients feel comfortable

a few hours after. In these cases, if the bladder be septic, effort should be made to get it into a healthy condition if possible; and, in fact, this would apply to all cases. Better results would be obtained if greater care were bestowed on the aseptic details of cystotomy. Free incisions in the presence of septic materials are very likely to be followed by serious consequences, though the lethal result may often be warded off by drainage.

If prostatic patients were taken early, and as soon as frequency and presumably residual urine were present, a few incisions with the cautery would bring about normal urination with the least amount of pain and inconvenience, and the operation could be repeated later on, as soon as it became necessary. Unfortunately, it is frequently, though not always, the patient who is to blame, for many a man never even seeks advice until he has absolute retention, and his prostate is very large indeed, so that our different methods of treatment must be well thought out in order that we may select that operation which is most likely to benefit the particular case we have in hand.

Given a clean bladder, and even a moderately healthy kidney excretion, the different operations dealing with the relief of prostatic obstruction will probably show an extremely low mortality. The 12 or 13 per cent. which is accredited to prostatectomy is mainly due to the fact that many a patient is operated upon almost from necessity when septic and renal changes are present to such a degree as to make the probabilities of recovery anything but great. Before deciding upon operation there are several matters worth considering. In the first place the patient's condition of health should be such as would allow of a major operation being performed in any part of his body.

If the urine is septic, an effort should be made, by the administration of urinary antiseptics, and by means of thorough irrigation of the bladder, to bring the field of operation into as healthy a state as possible.

I have frequently operated when a small amount of albumen was present, and a specific gravity of 1010, and with a result so favourable that the albumen has gradually disappeared and the specific gravity has risen. In the face of pyelitis, or suppurative nephritis, there is very little hope. A thorough examination of the prostate must be conducted so as to ascertain the precise form of the obstruction. In early cases the cystoscope is of immense value, but later on in large prostates it is useless.

Before continuing the examination the bladder must be emptied, or its tense fulness is apt to lead one to imagine that the prostate is of immense size. If the prostate is small per rectum and residual urine great, we have probably to deal with a middle-lobe enlargement. If the gland is large per rectum, it is more than likely that a bossy increase in size will be observed, needing some enucleation. The amount of increase within the bladder may be well guessed by the increase in the length of the prostatic urethra, as measured by a sound, and the limitation in movement to be felt on passing, first, a short-beaked and then a long-beaked sound. At times it is possible to conduct a bimanual examination in thin men.

I certainly think that it is unwise to attempt to adopt any single method in every case. Though I by no means would urge that every prostatic patient should be submitted to operation whatever his general or urinary health might be, I strongly maintain that prostatic disease should be attacked in the early stage, as soon as it interferes with the normal complete emptying of the bladder—firstly, because senile hypertrophy of the prostate is a progressive disease; secondly, because of the grave pathological possibilities which must sooner or later accompany a persistent resistence to urinary secretion; and thirdly, because the mortality of operative treatment, both immediate and remote, is far less than that of a purely expectant line of treatment.

A CASE OF REPEATEDLY RECURRENT SCIRRHUS OF THE BREAST, TREATED BY OOPHORECTOMY AND THYROID FEEDING, AND SUBSEQUENTLY BY EXPOSURE TO THE X-RAYS.

BY

C. E. Todd, Adelaide, S.A.,

With Notes of the X-Ray Treatment, by J. B. Gunson, M.B., Adelaide.

The subject of this case is a woman, æt. now forty-three. She had always been in robust health, until she noticed a painful, hard swelling in her right breast in September, 1898. I removed her breast by a very thorough operation, removing the axillary glands, and following as nearly as possible Mr. Watson Cheyne's description of this procedure. In a year the patient came back with some small nodules, evidently due to a recurrence of the disease, in minute outlying lobules of the breast. These were, all of them, several inches away from the central linear scar, and one of them was to the left of the sternum, although not, as far as one could judge, connected with the left breast. These nodules were removed. The scar itself was, and still is, free from recurrence, nor has there been any return of the disease in the axillary glands. Six months after this she came again with a gland the size of a walnut above her *left* clavicle, and since that time she has never been free from enlarged cancerous glands on one side of the neck or the other. Many of these have obliged deep and difficult dissection—exposing the pleura in the neck—for their removal. For some time before the oophorectomy there had existed a prominent, painful swelling in the middle of the sternum. At its apex there was an ulcer, with hard everted edges, about the size of a florin. The case seemed one in which an oophorectomy, as recommended by Dr. Bentson, of Glasgow, might be tried with good prospect of success. Accordingly, last September an oophorectomy—from which the patient recovered without a bad symptom—was performed. At the time she entered the private hospital, in addition to the prominent ulceration on her sternum described above, there were many tender enlarged glands in the neck. Some of these were quite the size of a large walnut, and were rapidly growing. Thyroid feeding was begun by giving two tabloids a day of 5 grs. each ; subsequently increased to 15 grs. a day. The effect on the glands was most marked ; the pain in them began to subside at once, and at the end of a week was quite gone. At the same time the swelling over the mid-sternum got smaller, and in two months' time had shrunk to a quarter the size it was at the time the operation took place. This improvement has still gone on, and at the time of writing the glands in the neck are about the size of large peas, and the prominence of the sternum has quite gone. The patient, too, is in excellent general health. The only part of the growth which showed no appreciable change was the ulcerated surface on the sternal prominence ; this, I think, continued to get deeper, although it did not increase in superficial area. This seemed a condition which might be improved by exposure to the X-rays, and Dr. Gunson very kindly undertook this form of treatment at the Adelaide Children's Hospital. His account of the result is appended.

It is difficult to form an opinion as to the amount of benefit which may reasonably be expected from an oophorectomy and thyroid feeding in cases of inoperable breast cancer. A perusal of the recorded cases does not help one much. On the one hand surgeons report that the improvement is marvellous in some cases ; and on the other, those of equal experience say that

this operation is disappointing in its results. Dr. Beatson, who originated the procedure, is so hopeful that, at the Annual Meeting of the British Medical Association at Cheltenham, he put it before the members for consideration, whether in all cases of breast cancer oophorectomy and thyroid feeding should not take the place of every other method of treatment whatsoever. To answer this in the affirmative would not be warranted by the reports of the cases which have come under my notice.

There is a very exhaustive review of the operation under discussion by Dr. H. T. Bullin in the *British Medical Journal* of Jan. 4, 1892. Mr. Bullin does not go so far as to say that oophorectomy and thyroid feeding for mammary cancer is unjustifiable, but he has very little hope that time will prove them to be of really practical value. If one might be permitted to give the conclusions which one has formed from a perusal of reported cases and my own small experience, they might be stated thus:—

1. Oophorectomy combined with thyroid feeding does not, in the real sense, appear to cure mammary cancer. The physical signs and the exhaustion due to the disease retrogress for a time; but it would seem that the disease advances sooner or later again.

2. The maximum benefit seems to be obtained in patients between forty and the menopause, when the ovaries are still active. Older and younger patients do not derive so much relief.

3. No effect is produced upon secondary growths, but only upon the actual recurrences of the growth, and the glands in direct communication therewith.

4. When the cancer has undergone ulceration, this does not appear to be greatly influenced by the operation. The work of the Bolingbroke Institution leads one to hope that in the exposure of superficial malignant ulcers to the X-rays healing can very often be brought about.

Mrs. F. (Cancer Case).

Mrs. F. has had, in all, eighteen exposures to the X-rays, as experimentary treatment for malignant ulceration of the scar of an amputation of the right breast for cancer.

The sittings extended from the 10th January to 13th February, 1902. At first daily, then every two days, and latterly about twice a week. On each occasion she has had an exposure of from ten to fifteen minutes. Cox's "Record" tube has been employed, with a coil working about 8-inch spark, but capable of giving 14-inch spark. After the eighth sitting, the tube being at 6 inches distance always, she complained of her face feeling burnt, slightly, and thought it might be slight "sun-burn." After this she was given a sheet-lead mask for face, and a similar shield was placed over her breast, with an opening extending about $\frac{1}{2}$ inch beyond the circumference of the ulcer, the tube being at 9 inches. The face-burning passed off in a few days; but each day the reaction increased in and around the ulcer. The ulcer at the beginning was an indolent one, with thick rolled edges and little discharge, about $\frac{7}{8}$ x $\frac{5}{8}$ inch, but very irregular, and its greatest depth was about $\frac{1}{4}$ inch. After a few sittings the discharge distinctly increased, but as it became healthier-looking, it again lessened, the edges began to shelve off, and granulations appeared to increase. No local medication was used.

The redness about the ulcer due to the X-rays has become very marked in last four sittings, and this has also appeared on parts of the healthy skin of chest, where there have been some holes in the lead shield allowing the rays to pass through.

At the last sitting the ulcer had lessened to about $\frac{1}{2}$ x $\frac{3}{8}$ inch, was quite shallow and healthy-looking, with sloping edges fringed with new epithelium; it was much more regular in outline.

It appeared to be rapidly healing. The surrounding reddened skin did not seem damaged, nor did the patient complain of any pain or inconvenience from it. She was delighted with the apparent success up to then.

March 18, 1902.—I have examined Mrs. M. F. to-day. She is in excellent general health, and the affected glands in the neck are now hardly to be felt. The prominence of her sternum has completely subsided, and the ulceration at its apex has now entirely healed, and the skin round looks normal and healthy—in marked contrast to the dilated vessels which existed before treatment was begun. I would describe the result as marvellous.

PROSTATECTOMY.

BY

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Lecturer on Anatomy, Melbourne University; Surgeon to St. Vincent's Hospital, Melbourne; Surgeon to Out-patients, Melbourne Hospital, &c.

In a paper read before the Medical Society of Victoria in July, 1897, on "Enlargement of the Prostate Gland, and its Surgical Treatment," I urged that the most rational and satisfactory method of dealing with most cases of this condition was prostatectomy in the early stages of the disease, and said, "the most hope for the future seems to be in early enucleation" of the gland.

In the discussion on the paper, this view was strongly opposed, but further experience has confirmed my own belief in its soundness. I propose as briefly as possible to put that experience before you. I may explain that by prostatectomy I mean the removal of as much of the obstructing enlargement as can be enucleated by the finger, after incision of the vesical mucosa. I do not intend to enter into a discussion as to whether what is removed is, anatomically, the whole prostate gland and its capsule, as maintained by Freyer. As an anatomist, I doubt it; but as a surgeon, I claim that it is quite possible, in the majority of cases, to enucleate what is practically the whole prostate *en masse*.

When I discussed the subject in July, 1897, I had not actually attempted deliberately to remove the whole mass of the gland, having been, previously to that, in the habit of simply removing with scissors, cutting forceps, and the finger, outgrowths projecting into the bladder and its urethral orifice.

I performed my first complete enucleation in the case of a man, L.H., aged sixty-three, admitted under my care at St. Vincent's Hospital, Melbourne, on September 8, 1897. He complained of frequent and difficult micturition, and two months before admission had passed blood in large quantity in his urine. He had also been treated as an in-patient at both the Melbourne and Alfred Hospitals, by catheterism and lavage. I discovered a stone lodged behind an enlarged prostate. I performed supra-pubic cystotomy, extracted two calculi (of uric acid), and then enucleated the prostate, which, however, broke up into portions in so doing. The patient made a perfect recovery, and in three weeks' time was able to pass water perfectly naturally, and without undue frequency.

Notwithstanding the success of this operation, I did not perform it again until April, 1899, having in the meantime given a further trial to orchectomy and vasectomy. The results not being altogether satisfactory, I attempted to perform supra-pubic enucleation in a patient, Mr. C., referred to me by Dr. Gault. I found the prostate so deeply placed and so tough that I failed to remove it, and contented myself with cutting out with scissors a projecting middle lobe. The result was very unsatisfactory. The patient never succeeded in passing water naturally, and to this day has a supra-pubic urinary fistula. He was not a very good subject for operation, but I believe that I should have made a more determined effort, pushing the prostate up with a finger in the rectum. The prostate, however, was evidently of the firm fibrous variety that is not so suitable for prostatectomy.

In May, 1899, I successfully enucleated what appeared to be the whole mass of the prostate from a patient, W.C., aged seventy-two, at St. Vincent's Hospital, Melbourne. He had entered upon "catheter life," but after the operation was able to pass water quite naturally.

I will now briefly refer to two recent cases that seem to me to particularly emphasise the value of complete enucleation as opposed to vasectomy, or partial removal of outgrowths.

The first case is that of Mr. A., aged seventy-one, sent to me by Dr. Naylor, of Minyip, in September last year. The patient had suffered from difficult and frequent micturition for twenty years, and for the last two years had passed blood, causing complete retention and great pain, so that he required frequent catheterism, though he could at times pass a little water in dribbles, and about every half-hour—"overflow incontinence." In December, 1900, vasectomy had been performed, with no relief to the symptoms. His prostate was greatly enlarged and irregular, his bladder greatly dilated, and his urine contained blood, pus, and mucus. It was, however, of good specific gravity, 1020, and he was otherwise healthy. Suprapubic cystotomy was performed, and the prostate enucleated *en masse*. It was so large it could not be delivered through the wound, and had to be divided into three portions to get it out. It weighed 7 ozs., and, microscopically, was adenomatous. He made an uneventful recovery. He passed some urine naturally on the sixteenth day, and a few days later passed it all, micturating easily and painlessly about four times in the twenty-four hours, and his urine being free from albumen, pus, blood, or mucus.

The other case was that of Mr. M., who was referred to me in April, 1900, by Dr. Rothwell Adam. The symptoms began in 1888, when he had difficulty in micturition, and finally, almost complete retention. Suprapubic cystotomy was performed, and he was informed that "valvular obstruction at the neck of the bladder had been removed." After the operation, he could pass water voluntarily, though with difficulty, and increased frequency, but in two years' time he had to draw off all his urine by catheter. When I saw him he had great pain, and had to use his catheter every two hours, night and day. I performed supra-pubic cystotomy, and removed thirty-four phosphatic calculi from his bladder, and also cut out a projecting middle lobe of the prostate. He recovered from the operation very satisfactorily, but did not recover voluntary micturition. Catheterism, however, was only required every five hours. In November, 1901, he returned with all the old symptoms, requiring to use the catheter every hour. I was satisfied he had another stone lodged behind the prostate, which was much enlarged, and prevented a satisfactory examination with sound, though I could easily pass a No. 12 metal catheter into the bladder. He agreed to have supra-pubic cystotomy performed for the third time, and I then enucleated his prostate *en masse*, as well as removing a phosphatic stone. He made an uninterrupted recovery, and in less than three weeks could pass urine voluntarily for the first time for over ten years, and has continued to do so since.

Both these patients said to me—"Why was I not relieved in this way at first, instead of undergoing all the misery I have done for so many years?" A very pertinent question, and practically the one I put to the Medical Society of Victoria in 1897. Why not perform prostatectomy in the early stages of the disease? By delay and the institution of the catheter-life cystitis, possibly phosphatic calculi, and secondary changes in the kidneys are liable to be set up; the patient gets older, and the risks of operation at a later period are increased.

But it is urged the risks of the operation are very great in the early stage, and a late operation may never be required, many patients going on very comfortably with the use of catheters. Now, in reply to this, I don't think many patients do get on comfortably; they nearly all invariably die from their enlarged prostates in the end, and the catheterism is a very great handicap and inconvenience, apart from its risks.

Next, I maintain that the risks of operation are not so great as is thought. My experience is not very great, but so far I have not lost a case from supra-pubic prostatectomy. I find, on looking up my cases (though the records are not complete, as I could not find time to go through the Melbourne Hospital records), that I have notes of thirty-six supra-pubic cystotomies for different conditions, with four deaths. Three deaths were from uræmia after lithotomy, in old men, with advanced surgical kidney, and one from pulmonary embolism after operation for papilloma. That is to say, the mortality is chiefly due to the complications of the bladder trouble for which the cystotomy is done, rather than to the operation itself. The cases would have died very soon if no operation had been performed. As I have already observed, these complications are less likely to be present in early than in late stages of the disease.

While advocating early enucleation, I do not wish to maintain that it is the only treatment for all forms of obstructive enlargement. It is necessary to recognise that obstructive enlargement of the prostate gland may be of different varieties—general enlargement, with engorgement of vessels; general fibroid enlargement; and adenoma. The first variety causes "attacks of the prostate," often requires no operative treatment, and is the form benefited by orchectomy and vasectomy. The second is the least amenable to surgical procedures. It is not much affected by orchectomy or vasectomy, and it may be difficult to enucleate. The last is uninfluenced by orchectomy, and is easily enucleated, and so completely cured.

It is often impossible to determine the nature of the variety beforehand, but I believe the majority of the cases *causing distressing and continuously persistent symptoms* are due to the adenomatous form, and are best treated by early enucleation.

Discussion.

Dr. Nash: In regard to this operation, one question has always presented itself to me at the end of articles upon the subject. What is the nature of the incision through the bladder-wall on to the enlarged prostate? I would like Mr. Syme to give us some information. In one case, he said he had to enlarge the abdominal incision to allow a 7-ozs. mass to be brought through it; such being the case, the opening in the bladder-wall must have been extensive. It was wont to be, and it is now, in our textbooks stated, that one should be careful in the length of his incision into the bladder-wall in other operations. In his supra-pubic cystotomies Mr. Syme has had four deaths in 36 cases, a good result in view of the fact that over a large series of cases, mostly for stone, such experienced authorities as Sir Hy. Thompson, Mr. Cadge, and others, have not been able to reduce the death-rate below 15 per cent.; and it is not likely that in the class of cases now being spoken of it will be possible, on the whole, to keep mortality as low as this. Even if the dictum be accepted, and it be acted up to, that prostates should be operated on before catheter-life is commenced. A potent factor in the avoidance of hæmorrhage must be reaching the surface of the prostate proper, that is, beneath the deeper covering layer of the fascia, before the use of the finger begins enucleation. It is stated as an anatomical fact, that the plexus of venus, which bleed so freely, lies between two fascial coats covering the prostate.

H. Critchley Hinder remarked that the death-rate from prostatic hypertrophy, or its sequel, is probably greater than is usually estimated. Within the last two years I have seen eight men die, and die miserably, from hypertrophy of the prostate. The death-rate after operative treatment in my own cases amounts to the following:—Four deaths in twenty-eight cases;

one from bronchitis on the eighth day, one from secondary hæmorrhage, and two from a suppurative pyelitis and nephritis which existed at the time of operation. One of these was in such a condition that mere catheterism was more than he could bear, and though I intended only performing a perineal cystotomy for drainage purposes, I was tempted to shell out an adenoid mass, so that he is, rightly speaking, entitled to be spoken of as a case of prostatectomy.

There were twenty absolute cures, and three who had not a perfect result. One had from 2 to 6 ozs. of residual urine, and two had from $\frac{1}{2}$ to 2 ozs.

By cure I mean that the patient was able to completely empty his bladder; that he had no residual urine. I firmly believe that a metal perineal drain, such as I use, is of great assistance in forming and maintaining a full-sized urethra during the healing process, while at the same time it enables the bladder to be frequently washed out by a nurse without exposing the patient.

In answer to the question when to operate, I would like to emphasise my opinion, that as soon as frequency becomes evident, even before catheterism has been instituted, and when the bladder is clean, then is the time operation may be conducted with almost a certainty of success.

Bottini's operation is an operation conducted in the dark—so is the crushing of a stone; and each requires that practice and skill which comes with frequent manipulative work in the bladder. And after all, results show that one is as safe as the other to a careful, gentle manipulator.

Mr. Syme, in reply, said that he agreed for the most part with Mr. Hinder's remarks, except that he had no personal experience of Bottini's operation, which seemed to him an unscientific and uncertain method. As to the technique of of prostatectomy, he preferred the supra-pubic operation, because, by the perineal incision the operator might, from the depth of the perineum, be unable to reach the whole of the enlargement, and in his experience the supra-pubic opening drained quite as efficiently as the perineal did. In cases where he had found it necessary to make both, he found all the urine escaped by the supra-pubic incision—both being equally patent. As to the extent of the incision in the bladder—well, it depended on the case. He made a cut with scissors down on to the growth, sufficiently large to easily admit his fingers, and the rest was done entirely with the fingers; and how large the incision became by a process of tearing, depending on the size of the prostate and the ease with which it could be shelled out. The hæmorrhage was sometimes rather alarming at first, but was checked by sponge-pressure inside the bladder, and the finger in the rectum, and by irrigation with hazeline and hot water. As to when to operate, it was difficult to lay down an absolute rule, but generally, he would say as soon as catheterism became necessary, and the symptoms a distinct source of worry and inconvenience to the patient.

EXTROVERSION OF THE BLADDER.

BY

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Part I.—Four Cases of Transplantation of the Ureters, with a Sketch of the History of the Operation.

The cases which I wish to bring under the notice of this Section are comparatively rare, and I can only recall having seen some eight instances of this affection; of this number, six were inmates of the Adelaide Children's Hospital.

Till quite recently their treatment has been attended with very disappointing results, but the operative advances of the last nine or ten years are of a most encouraging character. And although three of my cases ended fatally, I am thoroughly impressed with the satisfactory results of the remaining case, and I hope that, with improvement in the technique, and with opportunities of operating upon cases before infection of the ureters has occurred, much better results may be obtained in the future. No amount of risk, however, need deter us in my opinion from endeavouring to alleviate the hapless condition of the victims of this deformity.

Case 1.

A.D. was under my care for ten years at the Adelaide Children's Hospital; when first admitted he was eighteen months old. The extroversion was of the usual character, reaching up to the umbilical scar, and it was complicated with inguinal herniæ. From 1890 to 1898 he was frequently an inmate of the hospital, where many hours were spent in devising and carrying out plastic operations to cover over the defect, and where our records show that he was under the influence of an anæsthetic on more than twenty-five occasions. The result on the whole was creditable and gratifying, so far as such a piece of surgical patchwork could be. But there remained two great drawbacks. Though in appearance and disposition a charming little fellow (he was nicknamed "Bubbles," after Millais' famous picture), his society was rather shunned owing to the abominable odour of decomposing urine which attached to him, and his *amour propre* was often wounded by the sneers of his companions at the dress which he wore—a sort of compromise between the kilt and a sailor's costume. Averse as he was to taking an anæsthetic, he said that he would willingly submit to anything that would enable him to wear trousers.

My idea had always been to attempt some form of extra-peritoneal transplantation of the ureters, but with the exception of the case reported by Mr. (now Sir) Thomas Smith (1), which was distinctly discouraging, I could find no assistance from the literature of the subject. However, I determined to make the attempt. My design was to cut a button of mucous membrane from the bladder-wall around each separate ureteral orifice, so as to save any valvular or sphincteric action which it might possess; then to detach the ureter from the bladder and strip it up from the retro-peritoneal cellular tissue; and lastly, to draw the ureter through a small extra-peritoneal

(1). Mr. (now Sir) Thomas Smith—St. Bartholomew's Hospital Reports, Vol. XV., 1879.

puncture of the coats of the rectum, made by thrusting a pair of forceps through from the interior of the bowel. This was accordingly done on May 12, 1890, and no difficulty was experienced in doing it, but my assistant unfortunately removed one pair of forceps—the pair attached to the right ureter—which would seem to have become detached from its trigonal orifice. The pair on the left ureter was left *in situ*, its handles projecting from the rectum. The result was a considerable success, as the left ureter remained transplanted, with a projecting button of mucous membrane in the rectum. The right ureter, however, worked out of the rectum. In June a second attempt was made to replace it, but the following day it slipped out again, after which the structures could not be sufficiently identified to allow of its replacement.

Professor Watson now urged me again, as he had previously done, to try a trans-peritoneal implantation of the right ureter into the bowel, although a Madyl's operation was no longer possible. Accordingly, with his kind assistance this was done, but without his anatomical knowledge I should have probably failed to discover the ureter in the pelvis, owing to its perverted course, so that all the credit of this part of the case must be given to him. On August 10, after preliminary disinfection of the bladder surface, the abdomen was opened by an incision extending 4 inches from the upper end of the bladder; the intestines were kept well out of sight with a large flat sponge; and Trendelenberg's position adopted. The bladder was separated from the lower part of the abdominal gap on the right side, pressure forceps being placed upon the branches of the deep epigastric artery. The right ureter was sought for at the back of the bladder, but it could not be found. Dr. Watson then with a knife divided the peritoneum along the anterior half of the right side of the brim of the pelvis, expecting to find the ureter on the inner blade of peritoneum. It was, however, ultimately seen to be running in the outer blade, parallel to the external iliac artery. Its course appeared to be directed towards the thigh rather than the bladder, and near the pelvic wall it was lost in cicatrical tissue. The distal end having been ligatured, the ureter was clamped lightly, divided, and detached from its cellular sheath. The exact site for implantation had been previously selected in the sigmoid flexure of the colon, a silk ligature being passed through the meso-colon in order to identify the site. The gut was now pulled up into the wound; an anterior longitudinal band was found, formed in reality by the junction of the two lateral bands. This was split for a distance of $1\frac{1}{2}$ inch, and its edges undermined. The circular fibres were thus laid bare, and at $\frac{1}{4}$ inch from the lower end the intestinal mucous membrane was pinched up between these fibres, and divided by a crescentic cut, with the convexity upwards. The extremity of the ureter was now threaded with a stout horsehair, having a needle attached to each end. These needles were then passed through the opening in the mucous coat of the bowel in order to pilot the ureter into the sigmoid, and they were made to emerge from the gut $\frac{1}{2}$ an inch lower down. The ureter was carefully sutured by its cellular sheath to the mucous membrane, whose margin was naturally inverted into the bowel; superficially to the ureter two folds of the circular muscular fibres were approximated by fine stitches so that the ureter might be lightly compressed by their contraction during defecation; and finally the longitudinal fibres and the peritoneal coat were sutured. The abdominal wall was closed in layers, the tendinous structures being sutured with kangaroo tendon, and the superficial structures with horsehair, the whole being reinforced with some through and through silkworm gut stitches. The operation was rather tedious, occupying us at least a couple of hours. The child recovered from the shock quickly, and vomiting soon ceased. For a time after each operation the urine seemed to irritate the rectum, but the bowel soon became very tolerant, until at length he could pass all night

without requiring the bedpan, thus disposing of the fear as to the behaviour of the bowel, it being formerly one of the arguments adduced to discredit such operations that the presence of urine in the rectum would necessarily cause diarrhœa, and in favour of this contention there was the observation that in a case of deformity in which the ureters opened directly into the bowel diarrhœa was present (Wood) (2)

In May, 1900, he came up for a final operation to obliterate the mucous surface of the bladder, all previous attempts by means of the actual cautery and by acids having failed. When last seen his condition was quite satisfactory (December, 1901).

Two points of interest remain to be mentioned. A fortnight or so after the first rectal transplantation he passed into the bedpan what appeared to be at first sight the end of his ureter, coated with phosphates. It proved to be a piece of ordinary rubber drainage tubing. The Superintendent of Nurses then informed me that in his earlier days in the hospital he used to "cut his teeth" on a piece of tubing if he could get hold of it. Query: How long had this tubing remained in his intestine? Again, after this same operation he lost his offensive odour, although all the urine passed per rectum was still pungently ammoniacal. At the operation it was noticed that the left ureter was much thickened, whereas the right was normal in size. This raises the question as to where the decomposition of urea takes place, for if on the open surface of the bladder, we should expect the bacillus to act upon the urine from both ureters.

Case 2.

Encouraged by the results obtained in the foregoing case, I felt justified in attempting to ameliorate the condition of a little girl, E.W., aged eight years. She had been operated upon, when only twelve months old, at the Adelaide Hospital, but without a good result. There were scars and tags of flaps in evidence around the extroversion; the ureteral orifices were visible, and could be seen to expel their tiny jets of urine alternately, not synchronously. The urine collected as it left the ureters was acid, but when collected in a bedpan it speedily became alkaline, and deposited triple phosphates and carbonate of lime—evidence that the urea-decomposing bacilli effected their purpose on the surface of the bladder, and not in the kidney or ureter, as would appear to have been the case with "Bubbles." In the collected urine there was a trace of albumen, and microscopic evidence of blood, but there was not any obvious suppuration, and certainly not any uretero-pyelitis. Various cocci were demonstrated to be present in pairs, chains, and groups, but of their exact significance I cannot speak.

The operation was performed on December, 1899. After a preliminary disinfection of the bladder surface, aseptic catheters were introduced into the ureters. The trigone was circumscribed by an incision, and detached as a plate of mucous membrane from the surface of the bladder, the ureters being traced up in the cellular tissue, until they could be made to run like the round ligaments in an Alexander-Adams operation. The abdomen was now opened, and the lowest part of the sigmoid, just at its junction with the rectum, was selected, a loop of silk, passed through the meso-sigmoid, serving to fix what appeared to be the best site for the transplantation. Trendelenberg's position was now adopted; the bladder was split down to the trigone, and the ureters were further freed until the trigone could be easily brought over the fundus uteri to the sigmoid. The sigmoid was then opened, and the whole mass inserted into it with half a turn, so that the right ureteral orifice was vertically below the left. The peri-ureteral tissues about ¼ inch from the

(2). Prof. John Wood—"Med. Chir. Trans.," Second Series, Vol. 34, 1869.
(3). Maydl—Wiener Med. Wochenschrift, 1894.

orifices were sewn to the mucous coat of the bowel; the mucous coat was elsewhere stitched up, and the other coats carefully sutured; finally the abdominal wall was sewn in layers.

For two days the patient went on very well, recovering both from the shock and pain; vomiting ceased; and the urine, which was at first bloody, became clear. But at 2 p.m. on the 3rd December she had a rigor, and became collapsed; on the 4th some suspicious moisture was seen to be coming from the bladder surface, although 24 ozs. were measured as passed per rectum. The child became emaciated, but she had no diarrhœa; occasionally she vomited. The abdominal wound gradually parted in the deep as well as the superficial layers, but the bowels did not herniate through. The urine passed per rectum gradually diminished in quantity. The patient lingered on till the eighteenth day.

At the post-mortem examination the wound was found to be represented by an isosceles triangle of granulating tissue, composed of peritoneum united by first intention, and backed by some adherent omentum. There was no general peritonitis, but there was pelvic peritonitis, localised by an adhesion of ileum to the sigmoid, and to the uterus, a cloaca being thus formed in which the ureters were found to be lying free, the cloaca communicating by a wide opening with the interior of the sigmoid. Each ureter was as large as a little finger, and the kidneys showed pyelo-nephritis. There was some ulceration of the rectum with phosphatic deposition. As a matter of accuracy, Professor Watson tells me that it was the upper part of the rectum, and not the lower part of the sigmoid, into which the transplantation was made. The pubic hiatus measured just over 3 inches, giving the pelvis a general resemblance to a bird's; the sacrum was almost straight.

Case 3.

Undeterred by the failure just narrated, and encouraged by the fact that Case 1 appeared to remain in good health, I thought it was justifiable to attempt transplantation of the ureter in a youth of sixteen, who had been an in-patient of the Children's Hospital on many occasions, since the time when he was first admitted under my colleague, Dr. J. C. Verco, in 1887, when only two and a half years of age. His case was very similar to that of "Bubbles;" during ten years he had been anæsthetised some thirty times; numerous plastic operations had been performed; in addition, on the left side castration and radical cure of hernia had been deemed advisable; later on, when one-sided pyelo-nephritis set in, the right kidney was first drained and subsequently removed, and as the suppuration did not cease it became necessary further to drain the ureter ([4]). In later years he was in the habit of paying us periodical visits in order to have phosphatic concretions removed from the interior of his new bladder, so successfully was the extroversion covered in.

In July, 1901, he was brought to see me again. He seemed to be in excellent health. When standing up his urine trickled away, but when lying down on his back he was able to retain it without its overflowing for a short time. This temporary power of retention was, however, of no real advantage, for whereas the urine collected after he had been carefully disinfected, and then washed with normal saline, was found to be quite clear, inodorous, acid in reaction, and free from albumen, or pus, any that was retained in the artificial bladder became immediately decomposed, turbid, and loaded with phosphates. The father told me that the boy's condition was really deplorable. No one could share his bedroom, and his presence could barely be tolerated in any living room. The lad, too, had arrived at an age when he had become naturally sensitive to the comments of others upon his condition.

([4]) A. A. Lendon—*Australasian Medical Gazette*, December, 1896.

Both the patient and his father were therefore prepared to run any risk on the chance of some improvement being effected. The boy had at times talked of drowning himself, and his mother, who predeceased him, had said that if she knew she were dying she would strangle the boy rather than leave him to the tender mercies of a possible step-mother. I may mention also in connection with this case an instance of maternal impression. When two months pregnant, the mother dreamt that the child would be a boy, and that he would suffer. She awoke and told her husband of the dream. The same night she dreamt again immediately afterwards that he was a boy, that he was deformed, and that he had a big red fleshy mass in the lower part of the stomach. She again woke her husband and told him of the dream, without making, I fear, much impression on the mind of her spouse, who was a wharf-lumper. She fancied that the child would be born dead; at the time she was nervous owing to the Russian scare.

On July 27 the work of years was ruthlessly destroyed by a single incision, it being necessary to completely open up the artificial front bladder-wall in order to find the remaining ureter. After bringing up the posterior surface with silk loops, the intermittent spout of urine was observed, and a catheter passed into the ureter. A rosette of mucous membrane was detached from the bladder, and the ureter, which could be plainly felt per rectum, was readily separated with the finger from its bed of cellular tissue. A pair of forceps introduced into the rectum was pushed into the cellular space recently occupied by the ureter; the points protruding through the bladder were seen to be covered by mucous membrane only; they were thrust through, and with them the catheter to which the ureter had been stitched was drawn into the rectum, and out through the anus; the stitch was now released, and the catheter removed; the hæmorrhage was but slight.

The boy did not appear to be very ill after this operation, but after twenty-three hours it was evident that the ureter was kinked, as he had passed no urine per rectum. Accordingly, on the 28th he was again anæsthetised, and the ureter drawn back out of the rectum. This was followed by an immediate flow of urine. A catheter with its end cut off was again sewn into the ureter. At this stage the amount of venous bleeding was noticed to be excessive, and much time was wasted in searching for its source. But the searching only seemed to lead to increased bleeding, and I had to content myself with pressure, and then, after freeing the ureter still more in the pelvis, it was re-inserted into the rectum, the catheter being left *in sitû*; the urine continued to run freely, in spite of considerable pressure being kept up in the pelvis; some saline was injected into the axillary cellular tissue.

Next day it was noted that 37 ozs. of urine had been passed through the catheter, which came away of itself on the 31st. The last of the pads used to control the hæmorrhage was removed on August 1, on which day it was estimated that the patient had passed about 2 pints of urine, using the bedpan about every two hours on an average. On the same day also acute parotitis of the right side set in, but this subsided without suppuration in a few days. On August 6 the estimated secretion of urine was 3 pints. The vomiting, which had been rather troublesome, ceased about this date, and a general, though very gradual, improvement set in. The bedpan was now only required about five times in the twenty-four hours; it is true that some moisture was noticed in the former site of the ureter, but with so much urine escaping per rectum, it seemed inconceivable that any could be leaking alongside the ureter. On September 7 he was up and walking about the ward, eating and sleeping well, and it was intended to have him transferred to our Convalescent Home; but on September 11 he had an attack of sudden pain about the umbilicus, with vomiting and fever; renal trouble was feared, and from this time the boy got gradually worse, became emaciated, and succumbed on October 3.

At the autopsy made five hours after death a remarkable appearance was the number of punctate petechiæ scattered all over the abdomen, outlining the scar of the old incision in the loin. These were noticed shortly before death, and were probably septicæmic. On opening the abdomen it was found that there was no general peritonitis, but that a piece of ileum, coiled up and so distended as to simulate the caput cæcum, was adherent to the recto-vesical pouch, being covered over by adherent omentum. When this knuckle of ileum was freed and unravelled, it was found to be about 8 inches in length. The tip of the appendix was also adherent to the pelvic floor, but the rest of the appendix, and the cæcum itself, though both were dragged down into the pelvis, were not involved actually in the adhesions. On freeing the gut from the pelvis a small cavity was disclosed, which might perhaps have held 2 drms. of fluid, and which measured $1\frac{1}{2}$ inch across; it had a brown shaggy surface, but it was not ulcerated. Into this cavity it was subsequently found, by passing a catheter down the ureter, that the last $\frac{1}{2}$ inch of that tube opened directly, it having escaped from the rectum. A small opening which would admit a crow-quill was further found in the ileum about 6 or 7 inches from the ileo-cæcal valve; through this opening all the urine had passed almost immediately from the ureter into the lesser bowel, and had traversed the whole of the large gut. About $1\frac{1}{2}$ inch from this perforation on the jejunal side the bowel was kinked, and above the kink it was natural in appearance, but from this kink down to the ileo-cæcal valve it was, as has been before mentioned, remarkably dilated; its mucosa, as well as that of the cæcum, was deeply congested and softened, but not ulcerated; there was also lining it a coating of altered blood, mixed with (?) phosphates; a little way up the cæcum there was noticed a hernia of the mucosa through the circular fibres, apparently recent, as it was filled with blood; the mesenteric glands were swollen and as large as beans. The rectum was normal in appearance, and only a faint trace of the hole through which the ureter had been passed was found.

The left kidney was enormously hypertrophied, and its ureter dilated; it weighed 16 ozs.; it was not a complete pyo-nephrosis, but a condition of surgical kidney, with necrotic apices of pyramids, and a few small scattered abscesses; there was blood-stained purulent urine in the ureter. The opposite ureter was still patent, and filled with pale viscid pus; its vesical end was contracted to a minute orifice; its calibre was wider, and its coats were thicker, than those of the left ureter. It is interesting to note this persistence of the excretory duct of an ablated gland. The two halves of the pubes were separated by rather less than 3 inches, notwithstanding that the boy was double the age of the little girl (Case 2). The bones were held together by the tough stunted penis, and its widely divergent crura, supplemented by a greatly hypertrophied triangular ligament, by enormous thickening of the fibrous structures underneath the neck of the bladder, by exaggerated ligaments of the penis attached to each crus, and by fibrous substitution of the erector penis muscles. The sacrum was curved almost as much as in a normal male pelvis.

Case 4.

This boy was sent up to the Children's Hospital, and operated upon at the early age of three months at the urgent request of his parents, who could not be induced to postpone it till the child was at least two or three years old, as I desired. The extroversion was of the ordinary complete character; in other respects the child appeared to be healthy, and was at the breast. The operation was performed on January 22, 1902, and the patient died in seventy-two hours. At the autopsy the cause of death was not obvious. The immediate shock, which was very great, had been recovered from; reaction had set in, and the temperature had ranged between 99·4° and 102°. Urine had been passed per rectum apart from the motions.

The Operation.—After the rectum had been well washed out, small Jacques' catheters were inserted into the ureters. The orifice of the right ureter was plainly visible, but that of the left was concealed in a mucous caruncle. Whilst these catheters formed a useful guide to the exact situation of the ureters, they were probably unnecessary, for when the trigone had been circumscribed and detached, the diverging ureters could be easily made out, and there was little danger of their being wounded. In circumscribing the trigone the bladder mucous membrane was cut with scissors first above the ureters. The mucous membrane was very much thickened, and the incision was carried down to the sub-peritoneal tissue. The trigone was easily freed above and laterally, but the inferior aspect of the ureters appeared to be attached very firmly to the ligamentous structures connecting the separated halves of the symphysis pubes. As soon as the ureters were sufficiently freed, the exposed sub-peritoneal fascia and the peritoneum were pinched up, and the peritoneal cavity was opened; the sigmoid was searched for and drawn through the wound, the many coils of ileum which had escaped being kept back with a gauze sponge. The next part of the operation was thus conducted outside the abdomen. The left longitudinal band of the sigmoid was stitched with interrupted sutures of fine silk to the deep or fibro-muscular edge of the upper border of the trigone. The bowel was now opened, and the mucous edge of the trigone was stitched to the cut edge of the sigmoid through all the coats. The trigone was now turned over, and its inferior edge border was sewn in a similar manner to the opposite edge of the opening into the bowel in two layers. Any possible weak points were reinforced, and the sigmoid returned to the abdominal cavity, and the wound closed with stout through and through silk sutures, the bladder mucous membrane being adjusted finally. When the child had recovered from the shock he was put to the breast, but he vomited frequently, and succumbed to exhaustion.

Professor Watson, who had assisted at the operation, made the post-mortem examination. He found no peritonitis; the ureters were not dilated, and water forced into them ran out through the anus. The silk suturing of the transplanted trigone was entirely covered with a pink layer of lymph. The central portion of the omega loop of the sigmoid was bulged upwards in the form of a bladder, and was full of urine stained with bile. The pubic hiatus measured 1 inch.

Remarks.

The history of the operations devised for the relief of extroversion is one of very great interest, although it is quite modern surgical history, being limited to the second half of the nineteenth century. In former days it was usual to recommend the wearing of an apparatus designed to protect the exposed bladder, and at the same time to collect the dribbling urine. With the introduction of anæsthesia, surgeons began to turn their attention to the possibility of rectifying this distressing deformity, and from the very first they set to work upon different lines, and with different objects in view. While most surgeons were contented if they could effect a decent closing-in of the exposed bladder surface by more or less complicated plastic procedures, some of the pioneers in this branch of surgery struck out boldly for themselves to effect what may be termed the radical cure of the deformity by diverting the flow of urine into the bowel. These early and meritorious efforts to effect a radical cure were not so successful as they deserved to be, and they fell somewhat into desuetude, whilst on the other hand plastic operations were evolved and improved which seemed to answer almost every purpose, except—and the exception is one of the greatest importance—that the patients could retain their urine scarcely any better than before operation, and had still to wear a urinal. To show the comparative estimation of the two classes of operations, palliative and radical, Treves, writing in 1891, says the latter

require only to be enumerated, and accordingly disposes of them in half a page of his "Manual on Operative Surgery," whereas he devotes thirteen pages to the consideration of the various and ingenious plastic methods which had been devised during the previous forty years, and which after another ten years may possibly be condemned to the limbo of discarded operations. Again, an American writer's opinion (Willard, in Keating's "Cyclopædia of Diseases of Children") in 1890 was that a complete cure could not be expected, but that a good anterior protection to the bladder might be made, and the urine directed into a pouch with a small orifice of exit, to which a urinal might be applied. At the same time he estimated the mortality from these plastic operations at from 12 to 20 per cent. To Maydl is due the credit of reviving the radical operation by means of uretero-intestinal anastomosis in the years 1892-3, and the many subsequent successes which have been reported, leave but little doubt in my mind that in the near future his method, or some modification of it, will supplant the uncertain and highly unsatisfactory palliative operations. I shall therefore confine myself to the consideration of the gradual evolution of the class of radical operation of which Maydl's is the best-known example.

The first step in the evolution of the radical operation was effected by Mr. Simon ([5]), who in 1851 succeeded in establishing a fistula between each ureter and the rectum. By means of a guarded needle introduced into the ureter he threaded the two ends of a loop of silk into the rectum. These he gently tightened until the loop came away, leaving an uretero-rectal fistula. Urine passed per rectum, but some still came out on the surface of the bladder, whereupon an unsuccessful attempt was made to close the end of each ureter. A year later the patient succumbed to calculous pyelo-nephritis, but the fistulæ were patent, and the feasibility of the operation was established.

The next two operations, by Lloyd ([6]) and Athol Johnson, were similar in idea to Simon's, but rather different in this respect. that they aimed at establishing a vesico-rectal, not uretero-rectal, fistula. A silk thread was passed through from the rectum into the bladder, and then a skein of silk dragged through after it, but unfortunately in both instances the pouch of Douglas seemed to come down lower than usual into the pelvis (as it frequently seems to do in extroversion), and as a result, it was traversed by the silk skeins, and both cases rapidly succumbed to peritonitis.

Timothy Holmes attempted to conduct the urine by means of a flexible metal tube from the neighbourhood of the ureteral orifices (he was unable to introduce his tubes into the ureters as he had intended) into the rectum as far as possible from the anus. He did not choose the direct route, but a circuitous one along the surface of the bladder, and then subcutaneously in the perinæum. The result was a failure. In another case, after plastic closure of the extroversion, Holmes established a recto-vesical fistula by means of a gradually-tightened screw forceps compressing the wall of the rectum and the adjacent floor of the bladder. The urine, however, could only in part be induced to flow into the rectum, and an attempt to close the bladder failed.

Such were the early attempts to divert the course of the urine from the exposed bladder-wall. Surgeons were naturally deterred by these failures, and were always, moreover, swayed by the fear that the rectum would never be tolerant of the urine, which it was thought would set up diarrhœa. This fear was strengthened also by the fact that in a much-quoted case in which the ureters had opened into the rectum at birth, the patient had suffered from diarrhœa (Wood).

In 1878 Thomas Smith (now Sir Thomas) launched out in a rather different direction. He admits that he was influenced by Simon's case, and he

([5]) Mr. (afterwards Sir John) Simon—*Lancet*, Vol. II., 1852, p. 568.
([6]) Lloyd—*Lancet*, Vol. II., 1851, p. 370.

wished to avoid the danger of wounding the peritoneum, as had happened in Lloyd and Johnson's cases. He decided, therefore, to attempt an extra-peritoneal operation in the loin. He first passed a catheter into the ureter as a guide; then he made an incision as if for left colotomy, hooked up the ureter, divided it as low down as possible, detached it, and inserted it into the colon, and sutured it there. There resulted from this operation a urino-fæcal fistula; four months later there was only a small fistula, which finally closed up thirteen months after the operation. The procedure was repeated on the right side, but the patient succumbed two days after. At the post-mortem examination there was found hydro-nephrosis of the left kidney, with no communication between the ureter and the colon; the ureter had evidently slipped out again. The right kidney was very large, the pelvis and ureter being much distended, evidently from kinking. The operator was disheartened by his failure, and wrote that he could see no encouragement to further attempts to connect the ureters with the bowel.

Meanwhile plastic operations were steadily gaining ground. The original methods of Pancoast and Ayers in America were improved upon by Wood of King's, Holmes (7) of St. George's, and Greig Smith of Bristol; new methods of technique were introduced by Thiersch, who substituted granulating, for raw flaps; and by Trendelenburg, who divided the sacro-iliac synchondroses, so as to approximate the pubic bones, as well as by Sonnenberg, who separated the ureters, stitched them to the penile urethra, and then stripped off the bladder mucous membrane and closed the abdomen.

Out of all the operations done by these various plastic methods, Hartley (8), of New York, is only able to satisfy himself as to one in which anything like continence of urine resulted. Perhaps the acme of perfection in technique is reached in such a case as Battle narrates in the Clinical Society's Transactions (Vol. XXIV.).

In 1894 Maydl reported two cases in which he had successfully revived the radical operation by inserting the ureters into the sigmoid flexure of the colon. In order to retain any sphincteric action which the ureters might possess, he transplanted the ureters together, instead of separately, and with them an elliptical piece of the trigone of the bladder. Other surgeons followed suit, but not always with such good results. Still, during the past eight years there have been a good many successes reported. Fowler altered the operation of Madyl somewhat by inserting the ureters into the rectum instead of into the sigmoid, and by a method of suturing the circular fibres so as to compress the ureters when a solid motion was passing over their orifices. Gersuny modified it still more by completely dividing the rectum, inserting the base of the bladder and the ureters into the lumen of the rectum, and sewing them there, subsequently anastomosing the divided end of the sigmoid with the anterior surface of the rectum nearer the anus.

The last development of the operation of transplantation of ureters is represented by the case which I have narrated (Case 1), where the peritoneal cavity is not opened, and although my next case operated upon in a similar manner failed (Case 3), still I am inclined to think that it will prove to be the method of the future, subject possibly to some slight modifications. Peters of Toronto (9) has reported a similar successful case, operated upon two months later than my case, which I must further acknowledge to have been more immediately successful and complete than mine, which was one-sided, and required to be completed by an intra-peritoneal implantation on the opposite side. I expect that better results will be obtained when these transplantations are performed before any ascending uretero-pyelitis has set in, but it is not always obvious to the parents that a dangerous operation is desirable, before the

(7) Timothy Holmes—"Surgical Diseases of Children," 1869.
(8) Hartley (of New York)—"Annals of Surgery," July, 1901.
(9) Peters (of Toronto)—*British Medical Journal*, Vol. I., 1901.

child's condition has become one of intolerable nuisance to himself as well as to the family on account of the ammoniacal decomposition of the urine.

Part II.—The Varieties and Origin of the Deformity.

The Anatomy of Extroversion.—In the ordinary variety of extroversion we find a convex, reddish tumour, covered by readily-bleeding mucous membrane, in the lower part of the abdomen in the middle line. This bulging tumour consists of the posterior wall of the open bladder, pushed by the pressure of the intestines behind it through the hiatus which exists in the muscular and bony structures of the hypogastrium and the pelvis. On the patient lying down the bulging may diminish in size, and be partially retracted within the abdomen. With the fingers it can be pushed back so as to form a cup, at the bottom at which the orifices of the ureters may be seen spouting their quota of urine intermittently and independently of one another. Projecting from the lower end in a boy there will usually be found a stumpy and broad penis, with a groove on its upper surface, and a redundant prepuce on its lower aspect continuous almost immediately with the scrotum. The scrotum may be quite natural, and contain the testes, or these organs may be retained within the abdomen. There are frequently large congenital inguinal herniæ. It is usually said that there is no umbilicus, but there can generally be found a flat scar at the top of the extroversion representing it. At the sides a fine scar shows where the mucous membrane of the bladder, the fasciæ of the recti muscles, and the skin are united. The hiatus of the abdominal wall thus extends through everything between the umbilicus and the urinary meatus, and its width is greatest at the pubes, where the bones are separated sometimes to the extent of 6 inches in an adult (Wood), but at the same time the deformity has generally an appearance of being rather limited to the pubic region, the site of the navel being much nearer than usual to where the symphysis should be.

So much for the ordinary type of deformity. We read, however, of many variations from this type, some of which may be considered as extreme degrees of the defect, others as minor degrees. To take the extreme cases first; the mucous membrane of the extroverted bladder has been found divided into two separate halves by a median cicatrix, and in one such case, complicated with imperforate anus, the ileum opened by a fistula through this cicatrix. Again, the bladder may be entirely wanting, and the ureters may open directly into the urethra, the vagina, or the bowel. Even in an ordinary case, as Champneys ([10]) has pointed out, there may be seen indications of this origin of the bladder from two separate halves in the fœtus.

The minor degrees of the deformity are highly interesting. For instance, Bertham Robinson ([11]) has reported a case in which there was a separation of the pubic bones, a bifid clitoris, and a linea alba converted into a wide cleft, but no deficiency of the bladder-wall. A slightly more marked degree of the deformity is seen in cases where this expanded linea alba is converted into a hernial sac containing the prolapsed, but perfectly-closed, bladder. Such cases were originally termed by Vrolik "ectopia vesicæ," the name "extroversion" being thought more suitable for the ordinary variety of the malformation with a cleft bladder. Mayo mentions a case in which a calculus was found in an "ectopia vesicæ;" the pubic bones were 5 inches apart. Again, it is said that separation of the pubic bones does not invariably occur. Nor does the deformity always reach as high as the navel; in one of my cases there was a considerable interval between this landmark and the top of the extroversion. Here we may assume that the urachus existed as an obliterated fœtal remnant. Then, too, what are termed cases of extreme epispadias are

([10]). Champneys—St. Bartholomew's Hospital Reports, Vols. XIII. and XVI., 1877 and 1880.

([11]). Betham Robinson—Clinical Society's Trans., Vol. XXIX.

probably minor degrees of extroversion, for the penis is described as stunted, the finger can be introduced along the gutter-like urethra into the bladder (Treves), the sphincter vesicæ is inefficient, so that there is incontinence of urine, and the bladder sometimes becomes prolapsed through the opening; whilst separation of the pubes is further mentioned as a complication (Morrie). Adams ([12]) has described the case of a girl of twelve years of age afflicted with congenital incontinence of urine, in whom "the pubic bones were firmly united, but a mesial division existed, starting from the mons veneris in front, and passing through the clitoris to the anterior wall of the urethra, the mouth of which was consequently widely dilated, and could not be properly contracted." Both penis in the male and clitoris in the female are said to be often absent (Schneider). This statement I cannot verify, but where the clitoris is present, as it most frequently seems to be, it is usually bifid. On the other hand, we do not read of a separation of the two corpora cavernosa of the penis. It has already been mentioned that in some cases the urachus is presumably closed. We must remember that the opposite condition, viz., patency of the urachus, occurs as a rare event, and that sometimes the fistula communicates freely with the bladder, which is otherwise quite natural.

When children with this deformity are born, an expansion of the structures of the cord in the shape of a thin membrane is said to cover over the defect. This, like the cord itself, separates by granulation at the margin of the hiatus, where mucous membrane meets skin.

The theory advocated by Morris, that epispadias indicates a state of torsion of the penis, can hardly be endorsed by anyone who has had an opportunity of dissecting a case of extroversion.

The Nature of the Deformity.—To understand the nature of this deformity we must recall what is taught us about the development of the bladder and of the external genitals. In diagrams of an early embryo we see a cranio-vertebral axis curved round the rudimentary alimentary tube, which consists of two blind ends and a middle portion. This middle portion of the primitive intestine communicates by a wide opening with the umbilical vesicle or yolk sac, a structure consisting of a layer of hypoblast surrounded by mesoblast, in which the omphalo-mesenteric vessels spread. At first this sac occupies almost the whole of the ovum, but soon it is eclipsed in size and in functional importance by a new structure—the allantois. The allantois is described as sprouting from between the pedicle of the yolk sac and the caudal end of the embryo as a glove-like tube, composed, like the yolk sac, of hypoblast and mesoblast. Its interior communicates with the hind gut, while round its outer coat the umbilical vessels course. This structure grows towards the chorion, and the spot at which it is ultimately attached to the chorion becomes the placental site. As the allantois develops, the umbilical vesicle ceases to grow, and remains represented by a cyst the size of a pea, connected by a long pedicle (the vitello-intestinal duct) with the navel. This pedicle usually becomes obliterated, but in the rare cases in which it remains patent it persists as a fistula communicating with the ileum. The obliterated pedicle of the yolk sac, and the pedicle of the allantois with the umbilical vessels twisted round it, constitute the umbilical cord. As the fœtus develops, the layers of the abdominal wall unite in the middle line, except just at the umbilicus. From the umbilicus to the hind gut the allantois may be divided into three sections, of which the middle portion becomes expanded into the future urinary bladder, the caudal section becomes the uro-genital sinus, before any differentiation of sex has taken place, while the umbilical segment becomes obliterated like the whole of the extra-abdominal portion of the allantois. The uro-genital sinus opens at first into a cloaca with the intestine,

([12]). Adams—*Glasgow Medical Journal*, November, 1885.

but subsequently the anus forms, and the bowel is shut off from it. Bearing in mind these relationships, we can appreciate the origin of the many varieties of atresia ani which we see from time to time. Now, supposing that there is a failure of the abdominal walls to meet in the middle line, this failure may be partial, so that we have a thin scar in the place of the linea alba, with widely separated recti muscles and pubic bones, but the bladder is still protected, and its own muscular walls have closed in properly around the allantoic lining. This partial failure of development of the abdominal walls will explain cases of "ectopia," such as are described by Vrolik, ([13]) Robinson, and Mayo. But if the failure be complete, the delicate allantois has no backing to it, so that it sloughs and comes away with the umbilical cord. This may apply to all three sections of the intra-abdominal portion of the allantois, and then we have the usual variety of extroversion; or it may apply only to the lower two divisions, in which case the urachus presumably becomes closed, and a navel is seen at some distance from the top of the open bladder. I think also that the failure to close the abdomen may affect only the urethral or the urachal ends of the allantois, whilst the intermediate vesical portion becomes properly closed in. In the one case we meet with that complete form of epispadias which I have already described, and in the other case the result is some form of patent urachus. I suppose theoretically we might expect to meet with instances of deformity in which only the bladder was extroverted, whilst the urachus was obliterated, and the urethra fully formed; in such a case there might or might not be separation of the pubes. No such cases are, however, reported. The occasional division of the extroverted bladder into two halves is explained by the bilateral origin of the allantois itself.

([13]). Vrolik—Todd's Cyclopædia of Anatomy and Physiology, Vol. IV.

RECENT DEVELOPMENTS IN X-RAY APPARATUS AND IN THE USE OF THE RAYS.

BY

W. R. Fox, L.R.C.P., L.R.C.S. (Edin.).

The tremendous impetus given to this branch of physical research by Röntgen's discovery continues to make itself felt. It has, however, long been recognised that this branch of science requires special study and qualifications to enable one to utilise it efficiently and well. It has for this reason remained in the hands of those who have given it special attention.

The immediate effect of Röntgen's discovery was to alter this branch of natural science from the position of a subject of great interest to the scientific student only, to one of great usefulness to the medical profession and of deep personal interest to the general public.

One of the results of this has been a very great improvement in induction apparatus generally. In this connection, however, I desire to refer to the interruptors only, although all parts of the apparatus have participated in the general improvement. The introduction of electrolytic interruptors, however, which constitute the most recent improvement in this direction, is of direct interest to the surgeon.

Photographing the subject submitted to the rays forms, of course, a permanent record of anything that may be discovered by their means, but it necessarily means a considerable amount of extra trouble and expense, which, in many cases—I do not say in all—could be obviated if one could get a perfectly steady picture on the fluorescent screen. The various forms of motor-mercury interruptors, by very greatly increasing the rapidity of the interruptions, give a very much better result on the screen than the old contact interruptors. The motor-mercury interruptor, too, allows one to obtain complete saturation of the primary, a result that was often difficult and sometimes impossible with a contact interruptor. Still, the picture on the screen produced by the motor-mercury interruptor, although a great advance, and which perhaps may appear perfectly satisfactory to anyone who has not seen an electrolytic interruptor at work, is frequently far from being steady enough to allow careful and accurate study of the subject under observation. The introduction of electrolytic interruptors, which raise the interruptions to the enormous rate of very many thousands per second, however, has enabled us to present a perfectly steady picture on the screen free from all objectionable flicker or variation. This in many cases enables a complete examination to be made, and does away with the necessity of photographing the subject. Of course, such an examination in no way precludes taking a photograph if considered desirable. The electrolytic interruptor that I have been using for some years past is that devised by Dr. Wehnelt, of Munich. It is very easy to work, and exceedingly satisfactory in its results. It requires a higher voltage than the motor-mercury interruptor, but the statements so frequently made that it will not work on less than fifty volts are not correct. It will work satisfactorily from twenty-five volts upwards. I have worked it on as low a current as eighteen volts.

The Caldwell interruptor is also a very efficient one. Indeed, many say that it is better than the Wehnelt. It possesses the great advantage that it may be used on either continuous or alternating currents. The impressed voltage may also be varied over a wide range, but I am inclined to think that under the same circumstances it requires a higher voltage than the Wehnelt. As most of you are aware of the mechanical construction and principle of working of these interruptors, I have not thought it necessary to

Plate I.

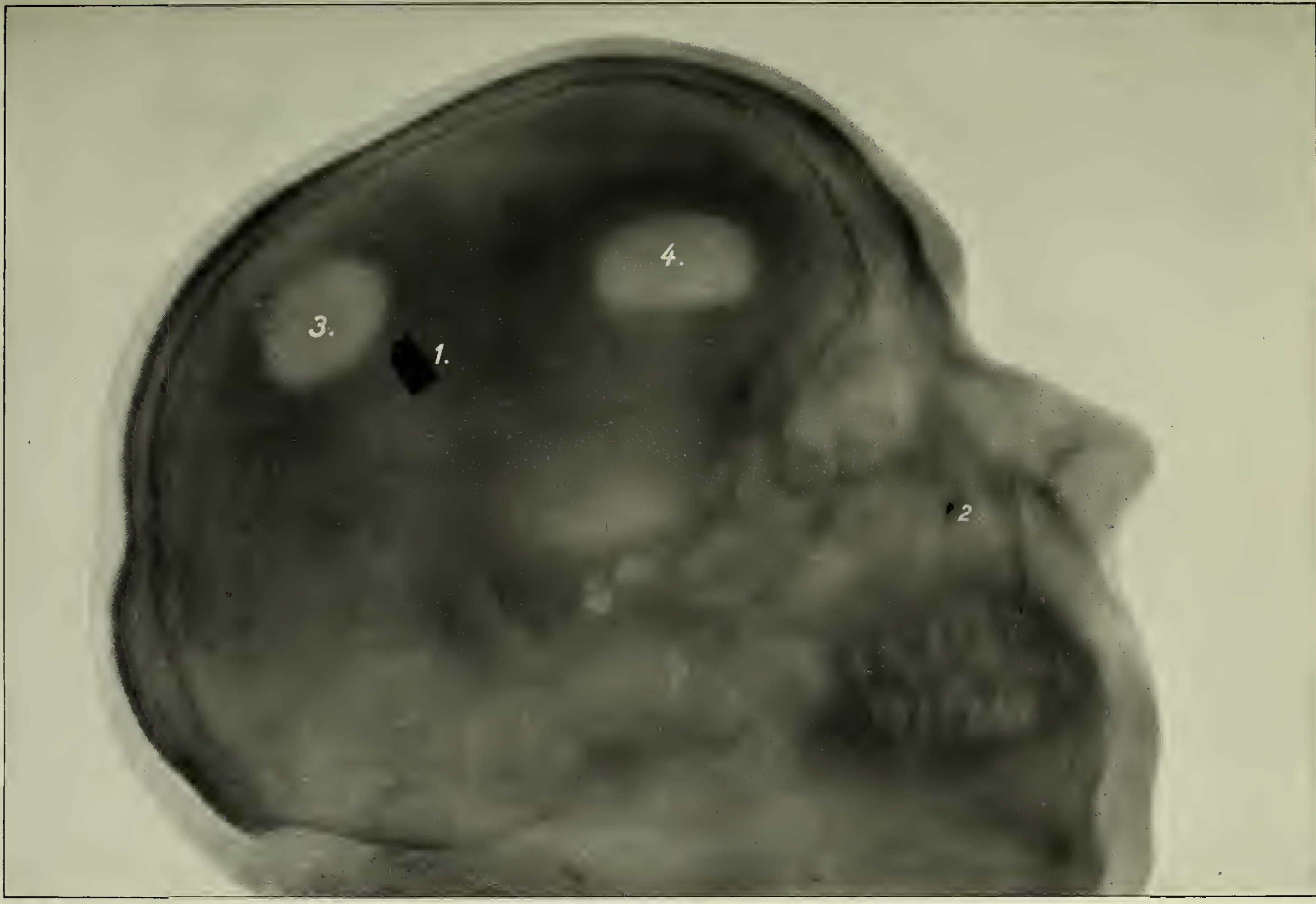

Plate II.

Plate III.

Plate IV.

take up your time with these details. Anyone who wishes for them can obtain them from scientific works.

Either of these interruptors may be worked continuously for a sufficient time to permit a lengthy inspection of the part under examination without any interruption, a proceeding the advantage of which it is difficult to over-estimate. Since, however, they use a considerable quantity of electricity, they can only be used satisfactorily when the required current is taken from a source of large capacity, such as the street mains, a large dynamo, or large accumulators. They can, of course, be worked from batteries, but these, generally speaking, would promptly become exhausted.

Those of you who have either used a properly-adjusted electrolytic interruptor, or seen one at work, will readily appreciate my remarks. It will readily be admitted that there are many cases in which such an examination, permitting the object to be seen from any and every point of view, possesses many advantages over photography. Take, for instance, the case where much time and trouble has been expended over the setting of a broken limb, and where it is imperative that the splints should not be removed unless good reason for it can be shown, an examination such as I have described will permit of the bones being seen from every point of view, whereas each photograph is restricted to only one position. The examination of a moving part, such as the heart or lung, is another instance in which the absolute steadiness of the picture is an enormous advantage.

Against this, however, there are many cases in which the advantage lies with photography, and in such cases the only assistance of an electrolytic interruptor is that it lessens the time of exposure.

The steadiness of the picture produced by these interruptors permits one to see many details also that quite escape notice when flickering of the picture tires the retina of the observer. For instance, in projecting an arm on the screen, not only can the bones be seen plainly, but the muscular layer can be distinguished from the subcutaneous fatty tissue, and the clothing to its smallest details is plainly visible.

Turning now to the subject of the uses to which X-rays have been put, one is astonished to find how many and various these have become. Originally introduced into surgery with the object of locating foreign bodies and observing the position of fractured or dislocated bones, we now find that X-rays have extended their usefulness in a very wide manner, particularly in the direction of medicine and therapeutics. It was soon shown that the stream of X-rays would penetrate the thorax and enable us to detect alterations of the thoracic viscera. The labours of Bonnet-Léon, Béclère, Bergonié, and Carrière in France, Espina y Capo in Spain, Walsham, Beale, and others in England, have demonstrated that in the normal chest, the heart, the aorta, the lungs, the upper border of the liver, sometimes the bronchial glands, and even the sectional outline of the pericardium, can be clearly demonstrated; while in diseased conditions, aneurysm of the aorta, dilatation of the heart, miliary tubercle, caseating tuberculous nodules, cavities surrounded by consolidated lung tissue, maligant mediastinal growths, croupous pneumonia, pneumothorax, pleurisy with effusion, and empyema are distinctly visible.

At the recent British Congress on Tuberculosis, it was shown that the rays will give evidence of the existence of tubercular disease as soon as, or perhaps before, it manifests itself in other ways. As an evidence of its reliability, it was pointed out that in over six hundred cases diagnosed as tubercular disease, the rays confirmed the diagnosis in over 98 per cent. of the cases. Since it is evident that the rays must penetrate the lungs in order to produce these results, the question very naturally arose as to whether they produced any therapeutic effect. If the rays exercise any influence over the tubercle bacillus in the lung, favourable or unfavourable, it is only reasonable

to suppose that they will have the same influence outside. In this connection the experimental observations of Wolfenden and Forbes-Ross on the effects produced by the rays on micro-organisms are of great interest. They began by experimenting on cultures of the bacillus prodigiosus. Cultures of this micro-organism exposed to the X-rays were found to grow luxuriantly, their growth greatly exceeding that of control cultures not exposed to the rays. This difference of growth was very marked, and extended to the fifth generation. There was also a very marked increase in the pigment-forming power of the bacillus, and this is all the more astonishing when one remembers that the bacillus prodigiosus loses this power when cultivated in warmth. This stimulating of the bacilli to vigorous overgrowth was due to a direct action on the bacilli themselves, and not to any alteration of the nutrient media. Precisely similar results were obtained with other micro-organisms, including bacillus coli communis, staphylococcus pyogenes citreus, staphylococcus aureus, and others. It was found that a sample of milk, X-rayed for an hour, showed a greater degree of acidification than one not so treated. This is due to the stimulation of the bacillus lactis—the acid-former of milk. A flask of Pasteur's fluid sown with yeast and X-rayed for an hour started fermentation sooner and much more vigorously than one not so treated. Some cress seed was X-rayed for an hour, and then sown in a box, and grown side by side with a similar box not X-rayed. Germination started much sooner in the former, and it was vigorously grown before the other had commenced. They have not yet, as far as I know, published any similar experiments on the tubercle bacillus. These experiments were carried out over a period of two years, and as a general result they state that they believe it is impossible by any ordinary long exposure to kill growths of bacilli or cocci by X-rays, and that any apparent death in such cultures is only exhaustion of vitality from excessive proliferation, since only rest is required to enable the organisms to again take on active growth. It has been lately suggested by Squance and others that the curative power of the rays in lupus is due to their causing "over-population" of the bacillus, and consequent dearth of food and starvation, and this certainly seems to accord with the results obtained by Wolfenden and Forbes-Ross. If this be so, the outlook in the direction of destroying the bacilli in the lungs by the rays is certainly not promising.

From the outset it was manifest that the radiation from an X-ray tube exercised a powerful influence on the skin. As a result usually of long exposure, dermatitis, more or less severe, hair-shedding, &c., were reported in many cases. In some instances the destructive inflammatory action was so severe as to cause the death of the tissues down to the muscular layer, or even deeper. Just recently I was consulted by a patient for another matter, who some year or two ago was the subject of a long X-ray exposure in Adelaide, with the result that severe destructive dermatitis attacked the greater part of the anterior abdominal wall, which is now the seat of a huge red scar or scars, interspersed with numerous scarlet mottlings. Now, for a very long time past I have been convinced that all this skin action is not due to X-rays, strictly so-called, at all, but is the effect of radiation of some other nature proceeding from an excited Crookes' tube. It may be of interest to give some reasons for this belief. You all know that aluminium possesses but little power of obstructing the rays. In fact, a sheet of it will cast only a faint shadow on the screen, and will make very little difference to the picture of a hand or arm when interposed between them and the screen. Although a thin sheet of aluminium will thus permit of the passage of nearly the whole of the rays, yet if spread over a part of the body, it will absolutely protect it from the above-mentioned ill-effects. Further than this, it has been stated that a sheet of silk or linen—materials which cannot pretend to offer any practical obstruction to the rays—will prove an efficient protection. Thin sheets of lead have been commonly used for this purpose, and yet the screen will

demonstrate that a very considerable portion of the X-ray stream will penetrate these. From this it must be concluded that, whatever causes the inflammatory action in the skin, it certainly is not the radiation which causes the illumination of the screen and exercises its actinic power on the photographic plate. Tesla is inclined to think that the platinum anode has some connection with this effect, and says it does not occur if the anode is made of some other metal.

Advantage has been taken of this peculiar action of the X-ray tube to ascertain if it possessed in suitable cases a sufficiently stimulating influence on the skin and superficial tissues to have any curative value. It was hoped that it would exercise some beneficial influence over cancer, but the only effect it had was to ease the pain, which it most certainly does, as I have myself seen. The only case of cancer improved by the rays, so far reported, is one of carcinoma of the breast, recorded by Dr. Andrew Clark in the *British Medical Journal*, Vol. 1, 1901, p. 1398. In this the improvement is most remarkable, and if the beneficial effect continued, certainly looks as if it should have ended in a cure. Mr. Alfred Cooper, in commenting on this case, suggests that its behaviour was more like rodent ulcer than scirrhus. It is, however, a most remarkable case.

In the treatment of rodent ulcer, however, the rays have proved singularly successful. In all probability the local character of this disease as distinguished from other forms of cancer contributes to this result. In lupus, certain forms of eczema, sycosis, and in one case of leprosy of the skin, the treatment by the rays has been successful. In the large suppurating surfaces left after extensive burns and scalds, the rays will promote rapid healing, and result in much less cicatricial deformity. It is possible that we are not yet aware of the nature of all the radiation emanating from an excited Crookes' tube, but we do know that it includes the following:—

1. Anode rays, which include the X-rays properly so-called.
2. Cathode rays.
3. Heat rays, which are much more manifest in small tubes than in those of 6 or 7 inches in diameter. In this connection it is interesting to note that I have failed utterly to produce hair-shedding or even the faintest erythematous blush on the skin in cases of superfluous hair on the face by long exposure to very large tubes, but small tubes in the same cases produced both effects.
4. Light rays, which do not seem of much importance, and which, indeed, are frequently shut out by covering the tube.
5. Electric rays or waves, which manifest their presence in a similar manner to the waves given out by other apparatus generating electricity of extremely high tension.

When one considers the above constituents of X-ray radiation, it ceases to be surprising that its effects are so many and so varied. With regard to rodent ulcer and lupus, I am strongly inclined to think that it will be found later on that the curative agent in this form of radiation and in that from the Finsen light are one and the same thing. However, this and many other questions in reference to this peculiar form of radiation have still to be solved.

Description of Photographs exhibited.

Nos. 1 and 2 were photographs of an injured elbow-joint in a child. The exact nature of the injury could not be made out on examination in the ordinary way. On the screen, however, the joint looked normal in a position of semi-flexion, but on extension the internal portion of the lower epiphysis of the humerus separated widely from the shaft. This was shown very plainly on the screen, whereas the photograph only just shows it.

No. 3 was a case of atlanto-axoid disease. The hypertrophy of the spinous process of the axis is remarkably great, and causing a projection of the soft tissues of the neck. The wisdom teeth, although not yet showing any signs of erupting, are plainly visible in both jaws.

Nos. 4 and 5 were photographs of an eight months' fœtus, born dead. Plate I. is a reproduction of one of these. It is interesting to note that we have here a substitute for the hydrostatic test. The lungs are of the same density as the abdominal organs, showing that the child never breathed. The bony development is most interesting; in the limbs there is no sign of carpus, tarsus, or patella, and only the shafts of the long bones are showing, together with the os calcis and astragalus. The bony vault of the skull is represented by frontal and occipital bones only, but the teeth are plainly visible, tipped with dentine. The sternum is absent. The age of the fœtus can be estimated by this means.

No. 6 was a photograph of the bullet in Dr. Fraser's brain, of which Plate II. is a reproduction. It plainly shows the position of the bullet (1), a small fragment of which (2) lies at the point of entry on the opposite side. The sites of the trephining operations, which were not successful in removing it, show as lighter areas (3 and 4), owing to the new bone being thinner. Since the bullet lies in the substance of the brain at a depth of about 2 inches from the nearest surface, the first operation site (3) is distant 2½ inches, and the second (4) 3½ inches from it. Dr. Fraser still lives with the bullet embedded in his brain, and its presence there has not affected his intelligence in any way. In the original photograph the two ear canals, the membranes of the brain, the thin area of the temporal bone, and the ethmoidal cells are plainly visible; but these and other details are somewhat lost in the above print, since X-ray pictures invariably suffer in this way in reproduction. The bullet was located by a method devised by me, and published in *The Lancet* of 21st September, 1901.

No. 7 was a photograph of a compound comminuted fracture of both bones of the fore-arm, a fragment of the ulna having been broken off. It is reproduced in Plate III. It is an example of photography in splints, and was taken three or four weeks after the bones were set. In the original photograph the cotton wool and one splint can be plainly seen, and the grain of the wood of which the splint is made can be seen through the styloid process of the ulna. Although no appearance of bony union is shown, the bones were sufficiently firmly united to render it impossible to rectify the malposition.

Plate IV. is a photograph of the same arm taken twelve months afterwards. This shows in a marked degree how the natural process of repair ultimately ends in an endeavour to rectify the faulty position. The new bone is deposited in such a manner as to smooth out as far as possible angular union, as may be seen by the slip of bone extending along the under surface of the ulna almost as far as its styloid process.

THE RONTGEN RAYS, WITH SPECIAL REFERENCE TO RENAL RADIOGRAPHY.

BY

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I propose reading to you a short paper embracing my experience and observations made in connection with Röntgen-ray work during the past five years.

During this period about 1200 cases have passed through my hands, both in hospital and in private, and though I admit that the methods employed are not the most recent, still my results have been so satisfactory that I have decided to briefly describe the apparatus employed, the methods adopted, and the results obtained, and in doing this I trust that the discussion which will follow will bring to light improved methods, and no doubt better ones than those employed by me at present.

I shall first describe my apparatus. In private I employ a portable apparatus, designed and specially selected for me by Dr. F. Harrison Low, the Secretary of the Röntgen Society of England. It consists of a 10-inch coil in an oak case, and in another case is a mercury interrupter and two rheostats—one for the coil and one for the interrupter—also a condenser and a small drawer for carrying the accessories. The interrupter is a motor-mercury one, worked by a four-volt accumulator. For the coil are two separate accumulators, each of six volts. The object of these separate accumulators is, of course, for the sake of portability. As a tube-holder, Dr. Low sent me Dr. Hedley's localiser, with a movable tube attachment. In Dr. Low's opinion this particular localiser is better adapted for this purpose than any other, and this statement I fully corroborate. My coil is by Watson, of London, and the accumulators are by the Lithanode Company, and this apparatus has been working almost daily for the past fifteen months without a hitch of any kind.

Tubes.—These I consider to be one of the most important parts of the outfit, and I can assuredly state that a man to be a successful radiographer must have on hand a large and varied supply of tubes. Personally, I have fifteen tubes, most of them of different patterns and by different makers, and in the department at the Sydney Hospital I have about twelve. Several of these tubes I obtained locally from Mr. Schmidlin. They are of German manufacture and of the bi-anodal type. I find these excellent for therapeutic purposes, and after working for some hours they show a good definition, and are admirable for thick parts. They last well, and seldom perforate. I possess several varieties made by Watson, of High Holborn, all more or less good, especially his cheap focus tube. I have several of his penetrator tubes, but I find that these vary very much. My first was an excellent one, lasting for eighteen months. At last it perforated, and I have not been able to replace it, though I have tried eight since. My best tube from Watson has been the automatic "Queen" tube, and with this I have obtained some very excellent results, especially when examining for renal calculi in thin individuals. I consider that such a tube used in a suitable case, *i.e.*, not too stout a patient, will give a definite renal result, either positive or negative, and whenever possible this tube is an ideal one for renal radiography. I have several high-vacuum tubes by Dean, of Hatton Garden, which give very excellent results; and quite recently I imported several of Cox's record tubes, similar to the pattern which was awarded the gold medal at the competition of the Society recently held in London. This is a bi-anodal tube, and gives

very brilliant results, as well as being the cheapest tube in the market—only 18s. 6d. If I were to select two tubes for working purposes I should select Cox's record tube and a " Queen" tube. Cox's tube, when worked for a while, gives highly penetrating results, quite as good, if not better, than most other varieties. For regenerating my tubes, I usually submit them to the heat of a spirit lamp, and find this answers very well, excepting, of course, those tubes which possess a special regenerating mechanism. I often put a tube on one side for several months, and find it occasionally works well when it had previously refused to do so owing to the vacuum having become so high. In private and in hospital I keep my tubes arranged as far as possible in order of vacuum, and consequently penetrating power, so that when a patient presents for examination, I know pretty well the tube to use. My hospital coil is only an 8-inch one, by Apps. This has been in use for five years, and has answered admirably. My floruescent screens are the ordinary barium platino-cyanide ones, and I frequently employ an accelerating screen, especially for renal work. This briefly describes my apparatus. I may say that originally the hospital coil had a platinum break, which I replaced by a " Vril," and then replaced by an ordinary mercury break, and I can positively state that I never intend employing a platinum break again, as they bear no comparison with the mercury ones. When a platinum break gives 8 inches, one can feel pretty confident that a mercury break will give an additional 2 inches. So far I have not had any experience with the Wehnelt break, though I know of several operators who have damaged a number of tubes with it. Of course, the advantages to be gained by using the Wehnelt are very great, especially as regards the necessary length of exposure, but so far as my experience extends I have not found any very great inconvenience in employing a longer exposure, as when using the motor-mercury interrupter.

Localisation.—In very few of my cases have I found it necessary to employ any special means of localisation. The greater number of my " foreign-body" cases consists of those where the foreign body—a portion of needle, as a rule—is in the hand or foot. I never experience much difficulty in localising in these cases. I always examine with the floruescent screen in two positions—one at right angles to the other—so as to get a fairly accurate idea of the depth. When examining in the antero-posterior position, I place a fine probe between the screen and the part being examined, and take good care to see that there is not any distortion of the bones. When I get the end of the probe to be just over the foreign body I retain it in this position, turn up the gas in my dark room, and then make a mark with an aniline pencil. This mark is retained till the operation, and indicates the line for incision. I always provide each patient with a note describing the size of the foreign body, and its depth. It very rarely happens that the foreign body is not extracted in these cases. In several cases of bullets the size of a small pea I have managed to locate in the same way. Then again in thicker parts it is not so easy to use this somewhat haphazard way of localisation. In these cases I employ the method suggested by Professor Barrell, Professor of Mathematics, University College, Bristol. No doubt it is known to most of you, but in case it is not, I shall briefly describe it. The apparatus consists of two metal cylinders, whose ends have been carefully turned perdendicular to their axis. The size recomended is 4 inches long and 1 inch diameter. These cylinders are placed upright on the plate during the exposures. The shadows cast by the cylinders are utilised to locate the position of the focus of the tube. After the first excitation the tube is shifted, say 6 to 10 inches; the cylinders also are shifted towards the opposite end of the plate, when the tube is again excited. giving rise to the second set of shadows from the foreign body and the cylinders. When the negative is dry, lines are ruled along the edges of the shadows of the cylinders and produced till they meet. Theoretically they should converge accurately to one point, and this

gives the point on the plate which was perpendicularly beneath the focus of the tube during the first exposure. The height of the foreign body above the plate is given by the formula—

$$x = \frac{d\ h}{d + l}$$

where,

$d =$ displacement of shadow of foreign body.
l displacement of tube.
$h =$ distance of focus from plate.

This method I have successfully employed in several cases, and the localisation has been proved to be accurate to the fraction of an inch. In one case especially was this method useful for finding a bullet which had become embedded in the femur, and had set up necrosis.

Résumé of Cases Treated.—The majority of cases which come under my notice are those with foreign bodies. A portion of a needle in the palm is by far the most common. Often an incision has been made, and an exhaustive search carried out before the rays have been applied. Such a proceeding I maintain should never be adopted when the rays are available, for in very many cases it is found that the needle has travelled some little way from its original place of entrance. A great many children are brought to the Sydney Hospital having swallowed a coin or some other thing, such as a locket, button, &c. In young children I often notice that the coins stuck just by the junction of the œsophagus with the pharynx. This is easily seen with the screen, and is almost as easily removed with a coin-catcher. Any obscure cases of fracture are always examined in the hospital, and many simple ones, too, if any doubt at all be present as to the nature of the injury. Several cases of sarcoma of bones have been diagnosed, and proved correct by subsequent operation. Necrosis of bone, too, has been well seen in several skiagrams.

I have not made a very great number of chest examinations, but in several cases the condition of affairs has been most clearly demonstrated. Tubercular patches, mediastinal growths, pleural effusions, and in one case an abscess of the liver, which had ruptured into the lung through the diaphragm, being clearly seen.

Renal Cases.—I have devoted special attention to these cases, and shall therefore enter into this subject more fully. During the past two years I have examined about one hundred cases suspected of having renal or ureteral calculi, and in only fourteen have I detected such to be present, twelve of which were renal and two ureteral. In several of these cases the symptoms were not by any means typical. In three cases the pains were situated on the side opposite to that on which the calculi were found; in one case a stone the size of a mandarin orange was found in a patient who only a few weeks previously had had a stone similar in size removed from the other kidney, and in two cases calculi were found in kidneys which had been previously operated on, and from which calculi had been removed. These latter cases afford a certain amount of interest, for the question arises: Were the calculi present at the time of the original operation and overlooked, or did they form again after the kidneys had been thoroughly emptied of all the existing calculi? To my mind the former was the case, for in each instance the patient did not derive much benefit from the operation, and after the second operation when the calculi were removed, which were shown in the skiagrams, complete relief was afforded. In a third case the patient presented all the symptoms of having a calculus in his kidney or high up in the ureter. He was operated upon, and the kidney and ureter explored, with a negative result. For a few months afterwards the patient derived some relief from the operation, but subsequently relapsed again into his former condition, and the pains he described as being intolerable. A skiagram revealed the presence of a

small calculus, and he was subjected to an operation, and the calculus removed was the size of a very small marble, and very soft, and composed of phosphates. The question in this case is: Was the calculus overlooked at the first operation, being then very small and soft, or did it form subsequent to the operation, for the pelvis of the kidney was opened into and explored, and it is possible that the remaining cicatricial tissue might have formed a nucleus for the deposit of the phosphates? If the latter is the case, then what was the cause of the original symptoms? This case presented many difficulties, for when the original operation was performed many adhesions were formed around the kidney, which was very high up, and was examined *in situ*. The patient also took the anæsthetic very badly, and so no doubt the operation was performed as rapidly as possible, and it is just possible that a very small soft calculus could be overlooked, notwithstanding the fact that a most competent surgeon was operating. I may mention that it is now a year since the calculus was removed, and the patient, who has been under observation ever since, is well and completely free from pain. In one case I found calculi to be present in each kidney, though the patient described the pains only to exist on the one side. In only one case so far were the calculi found to be in the kidney substance, and this case was one of those mentioned in which calculi had been previously removed. The calculi were very small, and formed two nests in the kidney substance, one nest containing seventy-four very minute calculi, and the other three calculi of somewhat larger dimensions. These, I feel confident, were overlooked at the time of the original operation, and would have been missed at the second operation, too, had I not insisted on their presence, and also directed where they would probably be found.

Of my fourteen positive results, three were subjected to the rays by different radiographers, with the verdict of negative result, and eventually, when they found their way to the hospital I obtained a positive result in each case.

As to the urine in these positive cases, sometimes it was what one would expect in renal calculus containing crystals, albumen, pus, blood, &c., and at times it would be clear, presenting no evidence whatsoever of a calculus being present. In the fourteen positive results mentioned the patients have been operated upon and the calculi removed. Of the negative results, three have been operated upon only, and the diagnosis confirmed; whilst in many of the other cases, other causes were found to have accounted for the symptoms. So much for my successes.

Now as to My Failures.—In one case, which I interpreted as a positive result, no calculus was found. This was a case of hydronephrosis in a thin, and so suitable, subject for the rays. The skiagram showed a faint shadow in the region corresponding to the pelvis of the kidney, and a second skiagram corroborated the first. Whether or no the operation was to be performed, as the patient was suffering so much pain and inconvenience from the kidney. When cut down and explored, the hydronephrosis was found to be due to a fibrous band in the upper part of the ureter, and the pelvis of the kidney was greatly hypertrophied, and I conclude that it was the hypertrophied pelvis which cast the faint shadow on the plate. In several of my cases when the patients have been very stout I have not been able to give a diagnosis of very much value, as so far as my results at present prove, a negative diagnosis in a stout individual is only partially to be relied on. In one case of a very stout individual, I obtained a negative result, and explained that not too much reliance could be placed upon it. The patient was subsequently operated upon, and a large calculus removed. In three cases in which I obtained negative results, small calculi were passed per urethram. In each case the patient had typical renal colic, but the skiagram, of course, was not taken until after the pains ceased, and it must have just happened that the

calculi passed into the bladder during these attacks, for after the skiagrams were taken and the negative results obtained, the patients had no further attacks of renal colic, and subsequently they returned and presented small calculi, which they had passed per urethram. Of course, it is just possible, though I do not think likely, judging by the results, that the calculi were present in the kidneys, and overlooked when I radiographed the patients, being too small to detect with the X-rays. This opens up a point, viz.: What is the smallest-size stone possible to be detected by the X-rays? Lester Leonard, of Philadelphia, who appears to have done most work in this branch, says he has detected a calculus weighing a grain. So far my smallest stone detected has been the size of a small pea. Then again, the question arises: If a stone is present in the kidney, and too small to be detected by the X-rays, should it not be left alone, as in all probability, as in the three cases I have mentioned, it will pass on into the bladder, and possibly per urethram?

The present state of my experience in renal cases leads me to make the following confession, viz.: In a thin person a negative result can be relied upon with confidence, whereas in a very stout individual a negative result is only of the same value as a negative result would be in the case of examining for tubercle bacilli in the sputum.

As to the technique in these cases, I can safely state that greater delicacy in manipulation and more experience is required in radiographing the kidneys and ureters than any other part of the body. After experimenting with several kinds of tubes, all of different vacua, I found that the most reliable results were obtained by using tubes of a low vacuum, and this result I communicated to the Secretary of the Röntgen Society of England, Dr. F. H. Low, and in a letter to me dated September 1, 1901, Dr. Low writes as follows:—"I am much interested in your success in kidney cases. I have not myself done well. I have had Dr. Lester Leonard (Philadelphia) here. He has done very fine kidney-stone work, and his story is much as yours—low tubes, exposures much as yours, but no screen. Over here we have all been going for short exposures and great penetration. I think that you and Leonard show us that this must be modified. I have a case coming this week, and shall go on the soft-tube line."

The value of the low vacuum was most exemplified in one case in which I took five skiagrams. The first one was taken with a tube of low vacuum with a positive result. Three other skiagrams were taken with tubes of higher vacua with negative results, and then a fifth skiagram was taken, using the same tube as in the first case, and a positive result again obtained. The case was operated upon, and the calculus removed.

In three of my "star" cases (positive cases) the rays had been used outside by different operators, and negative results obtained, and I have no doubt but that the failures were due to tubes of high vacua being employed. Now the tube which, in my opinion, is the tube *par excellence* for renal work is the "Queen" tube, or auto-regulator tube, Which I obtain from Watson's in Melbourne. As most of you know, this tube consists of an auxiliary bulb containing caustic potash, and when the vacuum gets a little bit high in the main bulb the current passes round to the auxiliary bulb, and heating it, causes some vapour from the potash to escape into the main tube, and so lowers the vacuum. This happens continuously as the tube is in work. I have many varieties of tubes in use, but none do I value as the "Queen" tube. I have used one now for $2\frac{1}{2}$ years, and it is as good as when I first used it. In several cases I have obtained calculi with a higher vacuum tube, but I feel confident that the easily-penetrable calculi such as the uric-acid variety are very often missed by using a high vacuum.

Leonard lays down an axiom which explains and corroborates all that I have already said, viz.: "All calculi will be detected if rays are employed that will differentiate between the shadows of tissues less dense than the least

dense calculus," and upon this is based the absolute negative diagnosis and the exclusion of all calculi." According to the axiom, one would need to obtain the shadow of the kidney in every case before being able to give a definite negative diagnosis. Only once have I managed to obtain the shadow of the kidney, and so far as I know it was quite unintentional. This was one of my first cases, and in addition to the patient being a suitable one, the tube used must have been of just the right vacuum. By "suitable patient" I mean a nice thin patient, without much muscular development, and anæmic if possible. Unfortunately for the operator, not many of the patients are like this, most of them being rather of the sthenic type. In answer to a remark *re* stout persons and radiography, Dr. F. H. Low replies:—"Referring to your letter, we all hate the sight of the stout patient when required to do any thick part. This difficulty is generally ascribed to the diffusion of the rays to the tissues. My misfortune," he goes on to say, "has always been to have had the stoutest possible when a kidney was wanted."

So far I have not attempted to apply the screen for the detection of renal calculi, and my reasons are as folows:—

In the first place I would not use a tube of high vacuum for fear lest a calculus, if present, would be penetrated. In the second place, by employing a tube of low vacuum I am afraid it would be too trying to the eyes to look for any length of time to form an idea one way or the other. There is no doubt to my mind that when the X-rays are playing on a part, that absorption at first goes on. The tissues so go on absorbing the rays, until they become thoroughly saturated, then penetration begins. Of course, if the vacuum be too low the tissues will not absorb sufficient of the rays to produce penetration, so that one can err on the side of employing a vacuum too low. A stout individual might be exposed to rays from a soft tube for hours without penetration occurring. The difficulty in each case is to use rays of just the right penetrating power, and as a rule I find the radiations from the "Queen" tube sufficient for the average patient. In stouter individuals I employ tubes of slightly higher vacua.

Now as to the employment of the accelerating screen. Dr. Low, in his letter, says that Leonard employs the same methods as I do, excepting that he does not employ the screen. Now in every one of my cases I have used the intensifying screen, and my present intention is to continue doing so. Of course, there is a slight mottling in the negative, and the definition is not so good as it would be were the screen not used, but there is no doubt that the exposure is diminished by this means, and this, of course, is a very great consideration. Screens vary much as do tubes, but I think I am lucky in possessing a good intensifying screen which does not show much granulation.

When taking a radiograph of a patient, I always make him lie flat on the couch, legs fully extended, and with a cushion or two under the head, and in this position make the patient as comfortable as possible under the circumstances. Then I place the screen, with plate enclosed, beneath the patient, so that the plate, which is a 10 x 12 one, will include the last two or three dorsal vertebræ. Very often, if I suspect that calculus might be present in the ureter, I insert the plate longways, so as to have another 2 inches of the picture. As a rule I place the tube 15 to 18 inches above the plate, with the anode about an inch below the xiphisternum. The anode faces the pelvis. I find the part just about the diaphragm the most difficult to penetrate, and so here I concentrate my rays as much as possible. Very often I manage to obtain the shadows of the psoas muscles, and when I manage this I usually can give my decision with certainty. My landmarks are the vertebral column, the last few ribs, and the crests of the ilia. Unless these are clearly discernible in the negative, I never give a definite diagnosis.

One of the most important things is to interpret the negative, and this very often causes me many restless hours. Sometimes it is possible to detect

the shadow of the calculus during the development of the plate. I make it a rule to allow white light into my dark room one minute after placing the plate into hypo-solution, for the unacted-upon silver makes a splendid background for detecting shadows of any sort, and very often I am able to discern more at this stage than when the negative is thoroughly fixed and dried. After this I find that the next best time to examine the negative is when dry. Then it should be taken into a suitable light and dodged about till every particle of the negative is thoroughly mastered and interpreted. A light greenish wall in my backyard forms an excellent background for examining negatives, and this I usually make use of, standing a few yards away. A cloudy sky also answers the purpose very well, and then again white blotting-paper placed behind the negative, or even the cover of the plate-box, providing it be white, as it is in the case of Imp. Sp. Plates.

Sometimes I intensify the negatives, and this often causes a shadow to show up better than it did previously.

Of course, I rely only upon the negative for the interpretation of the result, as a very faint shadow, just discernible in the negative, might be missed altogether in a print.

As a developer I always use the pyro.-soda mixture, and my formula is as follows:—

No. 1.

Pyro., 1 oz.

Sodæ sulphite, 4 ounces.

Adding a few drops of sulphuric acid to sulphite solution before pouring on pyro, and water to 16 ounces.

No. 2.

Sodæ sulphite. } of each, 2 oz.
Sodæ carb. }

Carb. potass., 1 oz.

Aj. ad., 16 ounces.

No. 3.

20 per cent. sol. pot. brom.

For use, 1 oz. No. 1, 3 oz. No. 2. Water to 8 oz. Add a few drops of pot. brom.

Vesical Calculi.—I have a number of skiagrams showing vesical calculi. Of course, the value of these skiagrams is not nearly so great as that of the renal ones, as it is usually so easy to detect the calculus by means of the sound. I think, however, that whenever a lithalopaxy is going to be performed, that a skiagram should always be taken beforehand to show the size of the stone, and also to see if one or more stones be present. In one case where only one stone was diagnosed, the skiagram showed two.

In case of hæmaturia, when the diagnosis lies between a papilloma, tubercular ulcer, malignant prostate or calculus, where the passage of a sound might aggravate the condition, in these cases the rays may be used with advantage, thereby saving the patient the inconvenience of having a sound passed. In taking a skiagram of the bladder, care should always be taken that the whole pelvic cavity be shown on the plate to its full extent.

I find the best position for the anode of the tube to be about 1 inch above the symphysis pubis. The tube should be about 18 inches above the plate, and if a thin patient a soft tube should be employed much the same as in renal cases. I always endeavour to get the sacrum to stand out clearly, and also the obturator foramina and tuber ischii. With these landmarks distinct it is almost impossible to overlook a stone. Whenever it is impossible for a case to come to my dark room at the hospital, I always have the apparatus taken to the bedside.

For fractures I never remove the splints providing they are wood, even in the case of iron ones a side view will often suffice. The same applies to

my private cases. Where possible the patient attends my surgery, which I darken by means of French blinds. Very often, too, it is necessary for me to take my apparatus to the patient outside.

Therapeutic Uses.—I have had several very successful cases under this heading, and also several failures. My most successful cases have been those of lupus erythematosus, five of which I have treated, and so far as one can say, up to the present cured. I apply the rays in the usual manner, covering the surrounding parts with tin-foil, and leaving a window for the part desired to be acted on. The tube I place at a distance of 5 inches, and the exposure as a rule lasts for ten minutes. In these cases at first I endeavoured to obtain a reaction, but now I do not think this is necessary, and in my last two cases I have obtained the desired effect without producing any reaction. I employ a tube of a medium vacuum.

Hypertrichosis.—I tried several cases. The hairs fell out after fifteen to thirty sittings, but they reappeared after the rays were discontinued. In one case I continued treatment for six months, but then had to wind up by employing electrolysis. In one case I managed to remove hypertrophied scar tissue from a girl's neck. This case I reported in the *Australasian Medical Gazette* of last year.

Before concluding this paper, I would like to say a few words about X-ray burns. So far as I know, only two of my cases have had a dermatitis following X-ray exposure. Neither of these did I see, but heard of them subsequently. One was described as an erythema, and the other as an eczema. I attribute my escape from X-ray dermatitis to be mainly due to the fact that I keep the tube away from the patient as far as possible, and also endeavour not to expose for too long a time. I always see now, too, that the vacuum of the tube is not too low, for this has been proved to be one of the main causes. Of course, idiosyncrasy plays a very important part. I might mention that I nearly always have a dermatitis of my hands. This is due mainly to the X-rays and partly to the lotions I use. Sometimes all the hairs disappear from my fingers, though at times they grow again. I noticed a marked change in my finger-nails. Formerly they were smooth, whereas now they are all more or less linear in appearance.

This, gentleman, concludes my paper, and though I may not have pointed out any very startling facts, still I hope that sufficient points of discussion will have been raised, and thereby improved methods to those employed by me revealed.

METHODS AND MANAGEMENT OF CIRCUMCISION.

BY

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THE origin of circumcision is buried in antiquity. Biblical reference to the rite is more than frequent, and the Jewish methods are probably a refined copy of the Egyptian ones. Many old bas-reliefs on the old Egyptian ruins represent circumcised children. The probability is, that the Mosaic rite being made a special point in the Jewish religion, was one of Moses' sanitary laws. In Africa, among the native tribes, circumcision has been practised from time immemorial, and it has become generally a sign of the admission of the boy into the manhood stage, and it is usually done between the ages of thirteen and fifteen. Among primitive races, like the aborigines of Central Australia, Baldwin Spencer points out it is the initiative rite of the boy to manhood stage, and is always accompanied by a slitting of the under-surface of the penis as well. This, he states, does not prevent procreation, and is not done for such an object; he also states that the operation is simply done with a sharp stone knife, and is never attended with any untoward results.

The operation, though a trivial one, needs special precaution. The patient, whether child or adult, should be put into good hygienic conditions; the instruments should be thoroughly asepticised; the parts should be thoroughly cleansed. The method of operating is best done by getting a pair of clip-forceps long enough to go over the prepuce, pull the prepuce out sufficiently, keeping clear of the frenum, and then with a scalpel sawing off the prepuce; then remove the forceps, divide the mucous membrane, taking care to do it in the centre of the dorsal surface. Always before dividing place a director under the mucous membrane, and free the adhesions—but take care not to place the director in the urethra—then pull back the mucous membrane approximate with the frenum; and then, if the surfaces are in good apposition, union is quick and perfect. I nearly always, in young children, when there is any hæmorrhage and they have to go a long way from hospital after operation, use the continuous suture, always tying it carefully, but not too tightly. I have never seen any ill-effects from it. The one point in sutures is to use a very fine needle. In very young children of ten or twelve days I do not think any suture is necessary, so long as time is taken in dressing. The dressing I always adopt is getting a small piece of lint about 3 inches long and $\frac{1}{6}$ of an inch in width, smearing it well with boracic ointment, 20 grs. to the ounce, wrapping the lint round the cut surfaces, carefully keeping them together, and then tying the lint on with a single horsehair suture in place of a bandage. I find this almost invariably keeps on, and does not want removing until the third day, when, if the child has been kept quiet on its back and not moved about too much, the wound is healed. In older children I find interrupted sutures are best; and also, this holds good for adults. I find also that horsehair, properly prepared, is the best suture, being easily removed, and not a source of persistent irritation like gut and silk seem to be.

At the Alfred Hospital the number of children that are being operated upon for balanitis, adhesions, bladder irritation (in some form or other), hernia, is steadily increasing, and shows that the poorer portion of our population is beginning to see the advantages of the operation. The great good that follows from the operation for adults is underrated. There is no doubt that

it removes certain impediments to intercourse, and is a great preventative of chances of syphilis, of intensified gonorrhœa, and possibly epithelioma, and under certain conditions removing a prepuce early may tend to keep boys from masturbation.

The points that I wish to emphasise are great cleanliness, perfect apposition of cut surfaces, sutures in older children, one proper dressing, care being taken that all hæmorrhage has closed, and then keeping as quiet as possible for four or five days. Remove sutures and dressing on third day, the object of rest being to prevent œdema, and the main advantages are cleanliness and the greater prevention of venereal diseases, and especially syphilis.

Case of Absence of Fibula.

AN OPERATION FOR ABSENCE OF FIBULA.

BY

W. Kent Hughes, M.B. (Lond.), M.R.C.S. (Eng.), Melbourne.

Absence of fibula has been looked upon as a curiosity, and few have ventured to suggest that anything should be attempted to overcome the very serious physical defect that is occasioned thereby.

The fibula is very inconstant in the animal series. Humphreys' "Treatise on the Human Skeleton" states, "In carnivora and pachydermata it is present as in man. In most rodents it is united with the tibia and the lower portion. It disappears altogether in ruminants. In birds its upper extremity enters into the knee-joint, articulating with the outer condyle of the femur. It is applied close to the tibia-like ulna in ruminants, and disappears about the middle of the leg. In reptiles it is large, extending from the knee-joint to the tarsus. In bats only the lower half is retained. The relation between its presence and absence of the outer digits is not so close as in the case of the ulna. It is very rarely absent in man. Sometimes it is united to the tibia by a broad plate of bone, especially at the lower end."

Congenital absence of the fibula is less frequent than of the radius or ulna, and it is more often deficient than absent, being, as in this case, represented generally by a small portion of the head of the bone. The tibia generally presents a sharp forward curve, and may be shorter than normal. The skin over the sharp curve is generally bound down to the tibia. The foot is limp and quite useless, and the patient walks on the internal malleolus. The tarsal bones in my case were represented by a fairly normal os calcis and a small astragalus. An undifferentiated mass of cartilage represented the scaphoid, cuboid, and external cuneiform, and two small cartilages represented the internal and middle cuneiform. There were three digits—the great toe and two others.

The number of digits seems to vary very much, and it is difficult to say that any one particular digit is not present. It is tempting to take it for granted that it must be the outer digits that are wanting, but we must not too quickly conclude that there is such an intimate relation between the fibula and the outer part of the longitudinal arch of the foot. In fact, the variety of deficiencies in the digits that appear with absence of the fibula, shows that there is no close relationship between them. In several cases all the toes have been present, and in one, only two digits. Most surgeons have contented themselves with dividing the T. achillis. As some equinus is invariably present, the extreme valgoid condition of the ankle, and a high boot with supports is ordered. The foot is very unstable, and the result most unsatisfactory.

Bardenhauer treated the deformity by splitting the lower end of the tibia, forcing astragalus into the cleft, placing the foot in a position of equinus. Volkmann removed a wedge from the angle-joint. Mickulicz performed an arthrotomy with resection of the astragalus, but, as Hoffa says, "Unhappily the brilliant results of the operations are of little use. The limb is correct as to shape, but very short, and the shortening is accentuated with growth."

Absence of Fibula.—R.S., male, æt. three years. Eighth child of healthy, well-developed parents. No other children exhibit any kind of deformity. In other respects the boy is exceedingly robust and well-developed. He gets about fairly well—bending the left knee, and walking

upon the internal malleolus on the right side. The right limb from anterior superior spine to the tip of internal malleolus measures 15 inches; the left limb 17 inches. The deficiency occurs mostly in the tibia, but from the anterior superior spine to the knee-joint there is a deficiency of $\frac{3}{8}$ inch, and the right thigh measures 1 inch in circumference less than the left, at a point 4 inches from the anterior superior spine. The right side of the pelvis is less developed than the left. The patella is displaced somewhat external to its proper position, being situated laterally as regards the knee-joint. The knee-joint is not normal, but it is difficult to say how it differs from the ordinary. It is capable of a greater amount of rotation, and on being rotated gives a "click." Extension and flexion are normal. The crest of the tibia is curved sharply forwards, just below its middle, and from this point the bone runs downwards and slightly outwards, owing to the pressure of the internal malleolus when the child walks.

The skin over the prominent portion of the crest is marked by a linear groove a little over an inch in length, but it is not attached to the bone as is described by Pearce Gould and Targett.

A slight trace of a head was found. The edge of the interosseous membrane, so clearly marked in the cases of Pearce Gould and Targett, is not easily felt.

There are only three digits present—the great toe and two smaller digits. The inner of the two smaller digits seems to articulate with a separate bone external to the internal cuneiform; the outer one does not correspond to the fifth in shape at its tarsal extremity, but it corresponds to the fourth in so far that it articulates with a process of the compound os calcis, which Targett has described as the "cuboidal" process, taking the place, amongst others, of the cuboid bone.

The foot is in a position of extreme talipes equino-valgus. The tendo Achilles is very tense, and the ligaments on the outer side resist any attempt to overcome the valgus.

The dorsum looks upwards, forwards, and inwards; the sole downwards, backwards, and outwards. The outer border is raised, the inner depressed and rounded. At the junction of the foot and leg on the outer side there is a deep groove.

The foot hangs loosely, but cannot be brought to a varus position, or even in a straight line with the leg. It is easily moved up and out, offering no resistance whatever.

The calf is very small, and corresponds in shape to that met with in congenital talipes equino-varus. Taking the lower portion of the internal malleolus as lowest point available for the purposes of progression, there is 4 inches shortening as compared with the left limb. But in spite of this the boy gets about fairly well, bending the left knee to overcome the defect.

The treatment adopted was as follows:—An incision was made along the groove on the fore and outer part of the foot, between it and the leg, the ankle-joint being freely opened up. After the skin was incised a thick layer of fat was met with before the diminutive muscles were reached. I came down upon what I took to be the tendons of the peroneus longus and brevis on the outer side, and in front the tibialis anticus and extensor longus digitorum. I failed to notice any extensor brevis, but as I had a long task before me my survey was very rapid and imperfect.

The anterior tibial artery was very small, and hardly caused any bleeding when severed.

When the joint was opened the astragalus was found to be small, and consisted mainly of the body. It was firmly held to the os calcis by the interosseous ligament.

The cuboid and scaphoid were not definitely made out, and no doubt existed, as described hereafter in Mr. Targett's case.

The os calcis posteriorly ended in a fair-sized heel, and anteriorly seemed to blend with other structures, as presently to be described.

I removed the upper half of the astragalus, and divided the posterior part of the os calcis obliquely from above and in front, backwards and downwards, leaving the tendo achillis inserted to the detached portion of bone, for which I made a bed in the lower part of the posterior surface of the tibia.

After carrying my incision towards the inner side of the foot, so as to completely free the ankle-joint by dividing the ligaments, I incised the lower end of the tibia, and made a bed for the anterior portion of the os calcis towards the anterior border of the inferior surface of the tibia. This was a decided mistake, as I was attempting to gain too much. I was unable to cover over the raw surface with skin flaps. The skin over the lower part of the leg and the whole of the inner border and inner portion of the dorsum was so thickened as to be useless for purposes of plastic operation.

In another case I should first treat the skin over the inner malleolus, which has been walked upon, by complete rest, &c., and if a healthy flexible skin cannot be obtained, it would be advisable to replace the corneous portion with a whole skin-graft before the operation is entered upon.

I had to be content with placing the cut surface of the os calcis against the lower part of the tibia, instead of to its anterior portion. The raw surface was then filled in with flaps from above and below. The foot, when finished, is, as you see, in a position of complete equinus. I gained at the time an increase of $3\frac{1}{2}$ inches in length. The child was fitted with a boot with a cork sole, which is $3\frac{1}{2}$ inches high posteriorly, thinning down to nil at the place where the ball of the toes comes in contact with the sole. Two steel supports, inside and out, with stiff ankle-joint and free knee-joint, completed the instrument. For the last six years he has used the limb constantly, running and climbing well, and even playing football and cricket. The following are the measurements:—

	Aug. 1896 (9 months after operation.)	Feb. 1902.	Gain.
	Inches.	Inches.	Inches.
Right limb—Ant. s.sp. to ball of hallux ...	$17\frac{4}{8}$ } $1\frac{1}{8}$	$1\frac{4}{8}$ { $24\frac{6}{8}$	$7\frac{2}{8}$
Left limb—Ant. s.sp. to sole ...	$18\frac{5}{8}$	$26\frac{2}{8}$	$7\frac{5}{8}$
Right tibia ...	$4\frac{6}{8}$	8	$3\frac{2}{8}$
Left tibia ...	$6\frac{4}{8}$	$10\frac{6}{8}$	$4\frac{2}{8}$
Right foot...	$5\frac{1}{8}$	$6\frac{4}{8}$	$1\frac{3}{8}$
Left foot ...	$5\frac{7}{8}$	$7\frac{6}{8}$	$1\frac{7}{8}$
Hallux, right ...	...	$2\frac{1}{6}$	...
Hallux, left ...	...	$2\frac{1}{6}$	...
Smaller digits, right ...	...	$2\frac{1}{6}$	...
Second digit, left...	...	$2\frac{1}{12}$	...
Circumference just above knee—Right ...	$8\frac{4}{8}$	$9\frac{6}{8}$	...
Left ...	$9\frac{2}{8}$	$10\frac{4}{8}$	...

In six years there is only a real loss in length of limb, as readjusted, of $\frac{3}{8}$ inch. The greatest loss has been in the tibia, 1 inch. In circumference the growth has been equal, and despite the interference with the growth of the os calcis, the left foot has only increased $\frac{1}{2}$ inch more than the right.

I consider the result eminently satisfactory, and as we have passed over six years of quickest growth, the relative shortening ought not to be increased; in fact, I hope that eventually, as the foot grows in length, that there may possibly be less difference than at present.

Mr. Pearce Gould (Trans. Path. Society, Vol. XXXIII.) describes a case almost identical with mine, occurring on the left side. In his case the two

outer toes were webbed, and there seems to have been less valgus than in my case.

Mr. Targett (Trans. Path. Society, Vol. XLIII.) describes the dissection of a limb which had been removed. The lower end of the tibia was bent outwards and backwards, and the sole looked directly upwards. The foot consists of three tarsal bones and three digits. The inner digit corresponded to the great toe, the second to the second toe, and the third to the fifth, probably, as it resembled it in shape, and articulated with the process of the os calcis, corresponding to the cuboid bone. There were three tarsal bones—(1) internal cuneiform; (2) another cuneiform external to it, probably the middle; (3) a compound bone, irregular in shape, and consisting of three processes, one posterior representing the os calcis, and two anterior representing the scaphoid and cuboid.

There is nothing in the situation of the astragalus, but the lower end of the tibia is connected by two articular facets with the compound tarsal bone. It may be that the astragalus is represented by the enlarged inferior extremity of the tibia.

EYE, EAR, NOSE, AND THROAT.

INTRODUCTORY ADDRESS.

BY

T. K. Hamilton, M.D. (Univ. Dub.), F.R.C.S.I., President of the Section.

In accordance with custom, it falls to my lot to make some introductory remarks in formally opening this Section here to-day. But before proceeding further, let me say how much I appreciate the honour that has been conferred upon me in asking me to preside over the deliberations of this important Section of our Congress. When I think of the distinguished men who have already occupied this Chair—two of whom I am pleased to see before me now—with the greatest credit to themselves and the utmost satisfaction to us, their fellow-members, I cannot but feel that the position I now occupy carries with it a distinction which any man may justly feel proud of attaining to. But distinction and prominent position usually mean responsibility. This fact so forces itself upon me now, that I approach the task allotted to me with no little apprehension, still, at the same time, with the determination to discharge the duties pertaining to the office to the very best of my ability.

The remarks I am about to make will, I fear, appear somewhat desultory and disjointed, and, inasmuch as the ground which our Section covers is represented by large and ever-increasing areas of distribution, what I have to say must also necessarily be to some extent general and comprehensive; but at the same time I shall do my best to make myself interesting, and that, as far as possible, to all members present, as I am aware that some of those whom I am addressing are less interested in some of the divisions of the Section than in others. And may I be allowed to express the hope that we shall find our mutual intercourse and interchange of ideas during the Session both helpful and stimulating, and that the work of this Section—represented as it is by specialists from every part of Australasia—may be as good as that done in any of the former Congresses.

As specialists, and living as we are in an age of specialism, we are tempted and often led—I believe at times unconsciously—to get into a groove, and the limitation of our medical horizon to become in proportion sensibly contracted. The huge increase of late years in all branches of medical and surgical science tends to make it increasingly difficult for the specialist to keep himself acquainted with the numerous other departments of the remedial art; in fact, to adopt the metaphor used by Professor Senator when opening the German Medical Congress last year, it would require a veritable medical Hercules now-a-days to master all the details of modern medicine, and to gain anything approaching proficiency in this science as a whole. But, nevertheless, to combat this inclination to exclusivism—I borrow the term from Sir William Gowers—and to prevent ourselves from becoming what Sir Felix Semon in his recent lectures designates "localists," should be our constant aim.

One object, then, I have set before myself now, is to so shape my remarks that while drawing attention to some questions of present-day interest in our specialisms, to demonstrate at the same time—as I hope I shall be able to do—the interdependence of local and general conditions one upon the other, or in other words, conditions which concern the specialist more directly, and those which are included in the larger domain of general medicine and surgery.

For this purpose let me, in the first place, briefly allude to the indebtedness on the one hand of general medicine to specialism, and of specialism to general medicine on the other. A few illustrations will suffice to show that this mutual indebtedness cannot now-a-days be questioned.

First, the debt of general medicine to specialism. Let us take, by way of illustrating this relationship, interstitial keratitis, with its characteristic non-dichomotous vessels (Hirrsberg), as an evidence of inherited syphilis. I remember hearing of a case in which Mr. Jonathan Hutchison—that prince of diagnosticians, and to whom we are mainly indebted for our knowledge of this form of keratitis—diagnosed a case of inherited taint from this symptom in the absence of the other usual concomitant symptoms, such as deformed teeth, scarring around the mouth, &c. Or again, in the same connection, the abolition of pupillary reflexes in both acquired and inherited syphilis (Babinski and Charpentier) as an indication of the disease having invaded the brain or meninages. Further, pupillary phenomena might be mentioned as giving a clue to the same general condition, *e.g.*, that present in and peculiar to alcoholic neuritis (Lauder-Brunton); tabes (Argyle-Robertson); recurrent third nerves paralysis; or the hemiopic pupil. Or take, again, another class of cases: diathetic conditions, such as rheumatism or gout. These conditions can often be fixed by the discovery of such local phenomena as tenderness over the thyro-hyoid ligament, as distinct from neuralgia of the superior laryngeal nerve, described by Avellis; hyperæmia of the eyeball over the attachment of the external rectus, with or without passing paralysis of that muscle; injection of the manubrial plexus of the membrane tympani with exostosis, or perhaps only a dry dermatitis of the external meatus; or the typical patchy congestion of the mucous membrane of the upper respiratory tract. Once again, take another class of cases, the discovery of various local paralytic or other developments, which, by affording the necessary completeness to the clinical picture, sometimes materially assist the neurologist, physician, or surgeon, in clinching the diagnosis, *e.g.*, laryngeal paralysis, which is occasionally one of the earliest signs of locomotor ataxy; the same as affording evidence of and determining the position of an aortal aneurism and of other thoracic growths; or yet, again, paralysis of portions of the third (accommodative and pupillary branches); or of the eighth pair (spinal accessory), following an illness in which there had been an exudation on the throat, and in which neither the clinical symptoms nor perhaps even the bacteriological examination—for as Klein remarks, and this may be a case in point, "the bacteriologist cannot sometimes do all that the clinician expects"—has enabled a definite diagnosis of diphtheria to be made at the time. Or, lastly, the two interesting and somewhat neurologically analogous conditions, congenital stridor and nystagmus of spasmus nutans in infants, in which conditions the specialist has been able to determine, by a process of exclusion, that they really depend upon a co-ordination neurosis.

Secondly, the debt we as specialists owe to general medicine. To illustrate this such instances as the following may be cited:—The presence of pneumonia in one individual affords an explanation of the appearance of double purulent otitis media in a second person, viz., the nurse in attendance, and that the patient's own wife, whom anxiety and mental strain had rendered temporarily vulnerable. The pneumococcus having become actively pathogenic in the body of each person, is the cause of these two distinct pathological conditions. The latter of these conditions, Zanfal says, is usually caused by pneumococcic infection, which in this particular case most probably reached the ears through the nose or throat. Again, the high artificial tension, which Sir Wm. Broadbent has recently described as the concomitant result of obstructed capillaries and arterioles, and as the cause of puerperal convulsions. This explains the origin of the condition which

the ophthalmologist knows as amblyopia gravidarum. Here the ophthalmoscope reveals usually more or less optic atrophy, and the sequence of events has been probably as follows: high intracranial arterial pressure during pregnancy, sufficient to force fluid into the optic sheath; this causing choked disc, perhaps retinal hæmorrhage also, and subsequent atrophy, and all of these occurring either during pregnancy or during parturition if convulsions—which are only the outcome of extra excessive arterial pressure—occur. Instances such as these two just given might be multiplied, but these will suffice for my purpose.

Next, let us, in pursuance of the line I have taken up, and in the light of our present-day knowledge, consider some few diseased conditions, which we may look upon as representative in their nature, and which, though actually belonging more to the physician, surgeon, pathologist, &c., inasmuch as we are indebted for this elucidation more to work done by them than by ourselves, are, nevertheless, conditions of extreme interest to us as specialists, and the more so because we are often called upon in our specialities to deal with the particular disease connected with such conditions in its most circumscribed, and sometimes, therefore, in its most accentuated, form.

Tubercular disease will probably occur to you as one of the principal of these conditions. The campaign which has of late been entered upon against tuberculosis with such vigour—a vigour hitherto unprecedented, I might say, in the history of any other disease in the annals of medicine—will, we may reasonably hope, soon begin to tell and lessen the development of tubercular diseases as a whole. When these happy results do begin to be felt, we, as specialists, may expect to notice the benefit even sooner than the physician or surgeon, inasmuch as tubercular involvement of the organs we have to deal with is usually secondary, and generally amongst the later complications in a given case. Let us hope that the day has already commenced to dawn when the prophecy made by Koch in his recent much-discussed and keenly-criticised address may be fulfilled, and that the 50 per cent. of lives he hopes to see saved may, under the now recognised proper hygienic influences, both prophylactic and curative, be rescued from premature death, and remain as living monuments witnessing to the triumph of modern medical art. Meanwhile, we as specialists have to deal with tubercular disease as it now exists, and with it, too, in some of its worst developments and in its most intractable forms. The ophthalmologist diagnoses tubercle of the choroid or the iris, and he has not much difficulty in deciding that the prompt removal of the globe is the correct treatment, and here his trouble ends. The aurist, however, is not so fortunate. His patient's middle ear is invaded by the tubercle bacillus, a purulent otitis media forthwith develops, and usually all that careful and well-directed treatment for this condition can do fails to stop the discharge, which symptom continues, in most cases, until the patient succumbs to the pulmonary or general affection. The rhinologist, though he is seldom called upon to deal with local tubercular disease, has usually, when it does occur, a difficult task given him to arrest its progress in the nose, and a still more difficult one to prevent deformity. Lastly, tubercular disease of the larynx, which Semon has designated "one of the most cruel complications of pulmonary tuberculosis," is, even after all that has been recommended and done in the way of its treatment for the past fifteen years, still in a most unsatisfactory state as far as remedial measures are concerned. In treating this and kindred tubercular conditions, we, as specialists, are tremendously handicapped. Our patient's vitality is probably considerably reduced by the antecedent and primary pulmonary affection before he comes into our hands for treatment. We believe in the efficacy of vigorous curetting, followed by lactic acid applications. Mark you! I say vigorous curetting, because nothing short of complete removal of the tuberculous tissue in such cases is

any good, but in many cases where such treatment is indicated as a proper surgical procedure, the otherwise unsatisfactory condition of the patient precludes the possibility of having it carried out, or, at any rate, we hesitate to ask him to submit to operations from which we cannot hope to get anything more than temporary relief for him. Tuberculin, both old and new, has failed us; all the hopes which its introduction raised were soon dashed to the ground, and now this remedy is relegated to the position of a purely diagnostic agent. Intravenous injection of hetol (sodium cinnamate)—a treatment from which we were led to expect much by its originator, Landerer—has also disappointed us. I have seen treatment by this injection most thoroughly carried out under circumstances most favourable to good resulting therefrom, but it failed to even arrest the progress of the disease, and the condition of the larynx remained uninfluenced. And this seems to have been the fate hitherto shared by other such boasted remedies. So that after all we are now driven by sheer force of circumstances to depend. for the most part, on palliative remedies. This is practically an admission of failure in our so-called curative treatment. But here, let it be observed, that when we begin to apply the word "cure" to such conditions as these under consideration, we must, on reflection, come to the conclusion that the expression has a very limited applicability, for when we consider that in tubercular laryngitis we have to deal with the local manifestations of a systematic disease, and not with a purely local process only, we can hardly wonder even if the local lesion be removed that it should, under such circumstances, break out again later on. We all know how much can be done by well-directed palliative treatment now-a-days to relieve symptoms, and how essential it becomes, especially when there is dysphagia, to prevent failure of nutrition. Amongst palliative remedies, I think, tracheotomy should occupy a place, especially where there is sufficient narrowing of the space between the chords to cause even moderate dyspnœa, and where intralaryngeal operations for the removal of the obstruction cannot be tolerated. I have found tracheotomy give the most wonderful relief, and from it alone the local condition, which necessitated its performance, showed a marked improvement. There are some rare cases also—only one of which I have seen—in which thyrotomy may be performed with advantage; these are cases in which the disease manifests itself in the form of a distinct growth which cannot be removed endo-laryngeally. There is just one ray of hope to brighten this somewhat dark picture which I have drawn of tubercular disease of such places as the nose and throat, and that I should like to refer to before leaving this subject. McIntyre of London has, within the last three months, given us what may be called a progress report of his recent experiments with high potential currents in various kinds of growths, and without binding himself to any definite expression of opinion at present, he leads us to hope that tubercular disease of the nose certainly, and that of the larynx probably, may be treated with satisfactory results by this method. We shall await with no little interest further reports on this subject.

Once again, malignant diseases will afford us another illustration of general and special conditions; and of the latter let us choose, first, malignant disease of the larynx. The views of surgeons seem to have become more harmonised during the last year or two on the question of the treatment of laryngeal cancer, the tendency being on the whole towards more conservatism than formerly. Chiari has shown that cancer of the larynx is capable of cure in many cases, and that therapeutic nihilism is here altogether out of place. The consensus of opinion seems to be gradually becoming formed in favour of thyrotomy as the most approved method of operation applicable, of course, to those cases only which are "intrinsic"—I use the term according to Krishaber's definition. This operation may be said to be the half-way house between endo-laryngeal removal, which is

tedious and eminently unsatisfactory, and complete excision of the larynx, which must, even though performed so skilfully as it now can be, according to the most improved technique, still be considered a formidable and hazardous procedure. Semon, in writing recently on thyrotomy, expresses himself as follows:—"It has been conclusively shown that in a good many cases in which the disease begins in the interior of the larynx, more particularly on the vocal cords, it can be lastingly cured by so simple and comparatively non-dangerous an operation as thyrotomy, with removal of the affected area and a zone of healthy tissue around it, provided only that the diagnosis be made sufficiently early for the affection to be still limited and circumscribed in character"; and he further expresses the opinion that, "while thyrotomy is still somewhat unpopular, an era of far greater usefulness is dawning for it." Here, again, there seems to be some reason for hoping that high potential currents may exercise a curative effect. McIntyre speaks with the utmost reserve on this point, but admits that the malignant disease in the larynx seems, at any rate, to be arrested by the treatment, and that cases now under observation are showing results sufficient to justify a continuation of the treatment.

Next, of malignant diseases elsewhere, which we, as specialists, have to deal with, *e.g.*, those of the eyeball. Here the ophthalmic surgeon is able, if an early diagnosis can be made, by removal of the globe, to secure perfect immunity from recurrence of such intraocular growths as sarcoma, or even a glioma. In two such cases which I can recall, I have been thus fortunate. Malignant disease commencing in some of the sinuses and extending into the nasal cavities—which is said to be the usual course such growths take—may usually be at once classified as "inoperable," but sarcoma, the commonest form of malignant disease in these regions—of the maxillary sinus or of the alveolus, extending into the antrum, so long as it has not invaded the nostril, especially the upper meatuses—this condition is often perfectly eradicable. I have had, during the last two years, three cases in which sarcoma of the antrum has been apparently, in each case, entirely removed, and no recurrence has so far taken place. In one, the anterior wall and contents of the cavity were removed after a previous ligaturing of the external carotid to cut off the nutrition of the growth; in the second, the floor of the cavity, and all the alveolus from the canine tooth backward, was removed; and in the third a partial resection of the upper jaw was done. But of inoperable malignant cases, what shall we say? From the use of injections successes thus far secured have been from the mixed toxins, and not from erysipelas toxins alone; but comparatively few really successful instances of indubitable sarcoma have been recorded as the result of Coley's fluid. I have seen this fluid used in a case of intranasal sarcoma, and the result was entirely nil. In inoperable rodent ulcer, *e.g.*, of the orbit, the X-rays have been successful in causing the sore to heal. Also, Finsen's light method has seemed to benefit this same class of case. Of other treatments recommended I cannot speak at all hopefully from my experience of their adoption. I have used formalin by injection where the skin is intact, and by superficial application when the surface is broken, both according to Mitchell's plan. I have injected alcohol into sarcomata and epitheliomata of the nose and throat, the advocates of which treatment claim that, at any rate, the alcohol circumscribes the growth and keeps it within limits, thus tending to arrest its progress; and I have administered arsenic in the form of injections of cacodylate of sodium according to Gautier's directions; and in no case have I noticed anything but transient improvement as the result.

Let me conclude by very briefly referring to the subject-matter of Sir Felix Semon's admirable lectures recently delivered in London. In these the author has dealt exhaustively with some of the abuses of our specialisms, and has vigorously condemned the extremes to which some surgeons have

gone in the direction of over-operation in various conditions of the upper respiratory tract. As the facts he mentions seem indisputable, and the arguments he adduces unanswerable, supported as they are by his own matured experience, the whole constitutes a serious indictment against some of his fellow-specialists, the correctness of which, I fear, we can scarcely dispute. But we all know that such excesses have not been confined to the practice of the throat specialist. A few years ago we remember the craze there was in America for partial tenotomy of the ocular muscles as a remedy for the relief of eye-strain. Steevens, of New York, it was who promulgated this idea, and judging from his writings he must have tenotomized an enormous number of eyes; but the treatment has had its day—a short one it was—and it has given place to more scientific and rational methods of dealing with the condition it was supposed to remedy. Again, aural practice affords us an illustration of the same kind. The demonstration of the method for removing the ossicula, originally made by Sexton of New York some fifteen or sixteen years ago, was followed by wholesale ossiculectomy for many and various conditions of middle ear diseases. Now the operation has, as it were, found its proper level, and recourse is had to it only in a limited number of selected cases, and under circumstances where good is known to result from the operation. In cases such as the two instances just cited, these operations failed to hold their own as legitimate operative procedures, simply because the principles underlying them were unsound; but in operations where the underlying principles are sound, be they ever so radical in their nature, they maintain their position without any difficulty. Illustrations of this are afforded in such operations as the "radical" mastoid operations of Stacke and Schwartze; Scanes Spicer's, or Jansen's operation on the maxillary antrum; or Luc's or Golovine's operation for opening and draining the frontal sinus; into which latter operation (Golovine's) the element of conservative surgery has been introduced as far as such can apply to this kind of operation, and Golovine's technique has, as you are aware, been improved on by our *confrère*, Dr. Kenny. I have done the operation with Dr. Kenny's modification, and I can testify to its worth and efficacy.

Gentlemen, I am afraid I have wearied you by occupying your time so long. I thank you for the kind attention you have given me. We shall now proceed to the work of the section.

SINUS SUPPURATION.

BY

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I wish to present to this Section of the Congress the results of an investigation into the condition of the various cranial sinuses found post-mortem, and to analyse the relationship between the diseases producing the fatal issue and the pathological state of their interior.

With this object I solicited the help of Dr. Stacy, Assistant Pathologist of the Sydney Hospital. He examined one hundred cases in all, noting the contents, and in some cases adding the bacteriological finding.

The cavities examined included the antra of Highmore, the frontal ethmoidal and sphenoidal sinuses, together with the lateral sinuses, middle ear, mastoid antrum and cells.

At the outset I fully expected the results to agree with that found by other investigators in the Old World. I was astonished to find a considerable variance, more especially relating to the ethmoidal and sphenoidal sinuses. So far as I am aware, this is the first time that such an examination has been conducted in the Southern Hemisphere. It therefore adds a further interest to the question, inasmuch as the element of climate can be included when we compare the results with those found in the Northern Hemisphere. The examinations cover a period of one year. During four months of that time an epidemic of influenza occurred, followed in a number of cases by a fatal form of pneumonia. This largely increased the mortality for that disease as compared with former years. Pneumonia accounts for twenty-two out of one hundred deaths when we include the two forms of the disease, and in no less than eleven cases were one or other of the sinuses involved, viz., 50 per cent. The sphenoidal sinuses contained pus in eight of those cases, and in this case clear fluid; so that we have here 50 per cent. of the cases lying of pneumonia implicating the sphenoidal sinus. This bears a relationship of about 23 per cent. to the total number of pus-infected cases. Of the whole number of cases dying of various diseases thirty-five were found to contain pus in one or other cavities—*i.e.*, 35 per cent. of the total number of cases contained pus.

If we deduct the 22 cases which died from pneumonia, we have left only fourteen cases whose cavities represent the result of a suppurative process.

The percentage of cases occurring in pneumonia was 45 per cent. We are thus justified in assuming that the pneumococcus and its associates are actively instrumental in producing disease of the accessory cavities of the nose. The proportion of cases is very large, and justifies the inclusion of suppuration of the tributary cavities of the nose as one of the complications of the disease. Pneumonia is a disease affecting the respiratory apparatus, and as these sinuses are practically invaginations of the first part of the respiratory area, we need not wonder at their participation in the same morbid process. They are air laden, and present to the pneumococcus the same conditions for the manifestation of its activity as the air cells themselves. How far suppuration in these cavities contributed to the fatal result, or whether they exercised any effect in this direction, is beyond the scope of this paper. Suffice it to say that we should occasionally meet with disease in these sinuses in patients who have recovered from this disease; not, however, in the same proportion as those found post-mortem, as many will have recovered, especially those who have had it for the first

time. No doubt the number occurring in hospital patients will be larger than among private patients, due to the better surroundings of the latter.

Lennox Browne refers to this subject in the following way:—"Acute sinusitis has been mentioned as a complication of pneumonia, but it is more probable that a pneumonia, as also a laryngitis or tracheo-bronchitis, is in such circumstances a consequence and not a cause of the nasal and nasal accessory inflammation. It is, in fact, an example of a head cold descending to the chest, which is recognised by popular traditions as an omen of gravity. Another reason for believing that the sequence of events is as I suggest is that the rhinal discharge is the first to disappear, and that relief of the laryngeal tracheo-bronchial and pulmonary symptoms promptly follow suit, and in the order named.

The pulmonary trouble may be produced in three ways: (1) By simple continuity of surface. (2) By surface chill of the body in the depressed condition characteristic of an acute nasal catarrh, wherein the patient is liable to somewhat profuse perspiration of the head and trunk. (3) If a bacterial origin be advanced as essential by simple conveyance of bacteria through the respiratory passages and the setting up of infectious foci in the lower respiratory tract and tissues.

Frankel is strongly of opinion that the pulmonary mischief is primary, and he speaks of a pneumonic form of antral suppuration due to the diplococcus lanceolatus, which he has found not only in the antral but also in the frontal and ethmoidal sinuses. Personally, I can hardly believe that the order of events is as Lennox Brown puts it, because pneumonia is frequently met with without any preceding head cold. We know that its invasion is usually sudden, and not gradual. Although it cannot be denied that a fair proportion of the cases succeed a cold in the head, which may have lasted from a few days, or even longer, before the inception of the pneumonia.

Hitherto influenza has been regarded as the chief causative factor of sinus suppuration, to which has been added some of the infectious fevers, such as scarlet fever, typhoid, smallpox, and measles. Hajck states in his Nebenhöllen der Nase that the pneumococcus is present in the antrum of Highmore in conditions of health. That being so, it is easy to see how it can be called into activity.

If I may be allowed to digress here from the strict title of my paper in discussing the etiology of these cases, I should like to include the clinical aspect of some cases which have come under my notice, with the view of raising the question of whether they are ever the primary factor in producing disease of the lungs. I have assumed that those cases found postmortem were acute. However, some must have been more or less chronic in their nature, as shown by the existence of polypoid tissue as part of their contents. If they existed before the pneumonia, do they contribute either as an exciting or predisposing factor in the production of the pneumonia? Of this I am sure, at any rate—that suppurating disease of the upper respiratory tract is now and again the cause of serious disease of the lungs. One case impressed itself upon me four years ago, in which a lady patient of mine, aged thirty-two, suffered from a suppurating sinus of the right tonsil. With her finger she was able to express sometimes half a teaspoonful of the pus from the tonsil. She deferred treatment for a time, became ill with pneumonia, which was complicated with peritonitis, albumen in the urine, and pain in the humerus, which latter was in all probability due to a septic osteo myelitis, and succumbed in the course of a week.

Some of you may have encountered cases in which the predominant symptoms pointed to bronchitis or bronchiectasis, and where the patients were treated with expectorants for years without benefit.

Three cases of this nature occur to me. The first was a young man, aged twenty-eight, who applied to me at the Sydney Hospital on account of obstruction of the nose, due to polypi. His frontal sinuses and antra of Highmore contained pus, and after these were cured he still continued to expectorate about 2 oz. of pus daily, which was subsequently found to be due to bronchiectasis. I have no doubt that in this case the sequence of events was extension downwards of the morbid process from the diseased sinuses. The next two cases had unavailingly been treated for bronchitis, and were regarded as incurable. This is a disease which I regard as a *rara avis*, and which is difficult to conceive of existing in the balmy climate of Sydney, unless as a sequence of some suppurating process higher up. These cases both showed rapid improvement after the antra had been opened and irrigated. The cough in these cases is quite characteristic, and when once heard is easily recognised again. It is loose, and requires no effort to unburden the bronchi of their contents.

Friedrich's excellent manual on "Rhenology, Laryngology, and Otology in General Medicine," page 28, says: "that diseases of the lungs may owe their origin to direct extension of the disease of the upper air passages to the trachea and bronchi. Chronic bronchitis is the most frequent of the various sequels, and proves very obstinate, especially in cases of chronic suppuration in the tributary cavities of the nose, where the pus trickles down from the nasal pharynx into the deep air passages, and sets up a chronic irritation. The question of the relation between chronic catarrh of the upper and the deep air passages has not received the attention it deserves; it is barely mentioned in the most general terms in connection with bronchitis, and the possibility of emphysema, bronchiectasis, or fetid bronchitis being due to such causes is usually ignored."

To further illuminate this subject I may cite two cases of gangrene of the lungs, which you will find included in the post-mortems, and in which the ethmoidal and sphenoidal sinuses were peculiarly involved, as they contained dark-coloured fluid, foul-smelling, together with a profound alteration in the lining membrane, the colour indicating necrosis. It is open to question whether this followed, preceded, or occurred simultaneously with the lung affection. It evidently partook of the same character as regards odour as the gangrene itself.

The fluid furnished a variety of germs, viz.: Streptococci, staphylococci, and diplococci resembling pneumococci.

Twenty-three cases of the total number contained pus in one or several cavities, while eighteen cases contained fluid other than pus. Polypoid tissue was found in the ethmoidal and sphenoidal sinuses in two or three cases, and in one case the frontal sinus contained a polypus. We know from histology that, apart from the antrum, the mucous membrane lining the sinuses is almost devoid of glands, and yet in several cases a viscid, gelatinous fluid was present. This could hardly be regarded as the result of a catarrhal process. The number of cases containing watery fluid is instructive as showing that catarrhal processes in the sinuses are less rare than was at one time imagined. I opened the antra in a case of atrophic rhinitis. Pus was found on one side, and a clear, watery fluid on the other, without any cyst wall. Anderson, in the *Lancet* of 1892, page 474, mentions a case of nasal hydrorrhœa with the symptoms which we generally regard as due to the escape of cerebro-spinal fluid, and which was caused by a polypus in the antrum.

In Harke's cases quoted in Grünwalds nasal suppurations of thirty-seven autopsies on people dying of typhoid, pneumonia, influenza, erysipelas, and meningitis, suppuration was found no less than thirty-two times, thirty-one times in the ossessory cavities. This, of course, is a much larger proportion than has been found in these cases, possibly the result of climatic influence.

The sphenoidal cavities were involved in not less than twenty-nine cases, nineteen of which contained pus. When we consider the infrequency of the diagnosis of sphenoidal suppuration, it is evident that a large proportion escape recognition at the hands of the specialist. I feel disposed to think that frequently the condition recognised as Törnwald's disease is merely a clinical simulation, and that the real disease is in the sphenoidal sinus, and the pus we see in the region of the bursa of Törnwald is merely the pus which has trickled down from above, and obtained for a time a resting-place there. This supposition is strengthened when we reflect on the results attending our efforts at cure.

How frequently do we fail in the local application of treatment to the bursa by means of caustics and antiseptics to cure or even modify the condition. By the way, there is a condition sometimes seen after the removal of an adenoid somewhat resembling Törnwald's disease, and evidently caused by the removal of the growth; as in the cases I have seen there was no morbid secretion present prior to its removal. This may possibly be due to infection of the sphenoidal sinus.

Dr. Stewart mentions in the *Lancet*, February 19, 1892, that suppuration of the frontal and sphenoidal sinuses was very rare. Such a statement is not supported by the findings in this series of post-mortems. Next in numerical importance comes the ethmoidal sinuses. They are involved in thirteen cases, eight containing pus, and the others variously-coloured fluid. Polypoid tissue was found in one or two cases.

Rosenberg says the age in sphenoidal diseases ranges from nineteen to thirty-five. In these cases it ranges from three to seventy-five.

Very little remains to be said of the frontal sinuses, as they were only eight times concerned in a departure from the normal state. Price Brown regards this as belonging to the domain of the oculist. The cases which find their way thither are the closed empyæma, and even these should undoubtedly be placed under the care of the throat specialists, as they require treatment demanding intra-nasal interference.

Only four cases of suppuration were found in the antrum, this paucity being due to the fact that a number of the earlier cases were left unopened. All the other sinuses were systematically opened in all the cases.

Bacteriology of the Sinuses.—This is very far from being exact, the chief reason being that cultures made from the contents of the sinuses are almost invariably overgrown, partly by saprophytic organisms, and partly by other organisms, which grow more luxuriantly than the more important ones we are seeking. Bacilli of the protes group (saprophytic) give most trouble in this respect. In films made direct from the contents of the sinuses we frequently have difficulty in distinguishing pneumococci from staphylococci which have assumed a diplococcal arrangement. In one or two cases the pus from a sinus of a patient affected with tubercular disease of the lungs, &c., was examined for tubercle bacilli with a negative result. This does not prove that the sinus disease was not tubercular, as we frequently fail to find them in phthisical sputum until the second or third examination. Putting aside the non-infective diseases, such as nephritis, chronic valvular disease of the heart, traumatic injuries, &c., we have left about sixty-four cases due to infection by micro-organisma; some acute, some chronic in their course; some infecting one or two organs only, others the whole body (becoming generalised through the blood stream). Of these sixty-four cases, thirty-four showed some affection of the sinuses, whilst thirty did not. Of the thirty-four, however, in many cases only a few of the sinuses were affected, and in some at least the conditions were probably not due to the current disease, but to a previous one.

Sphenoidal—	
Pus	19
Clear fluid	9
Bile coloured viscid fluid	1
Frontal —	
Pus	4
Clear fluid	2
Blood stained fluid	1
Dark coloured polypus	1
Antra of Highmore	4
Brown fluid	1
Ethmoidal sinuses	
Pus	8
Bile coloured visced fluid	2
Blood stained fluid	1
Thin dark blood	1
Clear fluid	1

Total number of cases cf suppuration of the accessory cavities. ... 35

Total number of cases with fluid other than pus in the sinuses. ... 20

Sex.	Age.	Disease.	Sinuses involved.
M.	47	Aneurism of subclavian	All healthy.
M.	65	Aortic incompetence	All healthy.
M.	46	Rupture of hydatid cyst. and peritonitis	Ethnoidal and sphenoidal, contain bile-coloured viscid fluid. Right mastoid cells contain blood
F.	66	Chronic nephritis	All normal.
M.	—	Chronic nephritis, with uræmia	All healthy.
M.	42	Epidemic cerebro-spinal men-gitis	Right ethmoidal and sphenoidal contain thin pus.
F.	—	Cerebral hæmorrhage and	All healthy.
M.	—	Acute tuberculosis of lungs	
M.	54	Primary lateral sclerosis	All healthy.
F.	22	Tuberculosis of kidney, ure-nephritis ter, bladder, and cerebral meninges	All healthy. All healthy.
M.	34	Cerebral thrombosis and softening	Hæmorrhage in r. m. ear and mastoid cells.
M.	16	Malaria and pneumonia	All healthy.
F.	77	Cirrhosis of liver and pancreas	All healthy.
M.	59	Septicæmia	Left frontal contains some clear gelatinous fluid; others healthy.
M.	36	Acute nephritis	Some clear fluid in sphenoidal sinus; others healthy.
M.	54	Lobar pneumonia	All healthy.
M.	22	Enteric fever	Fluid blood in m. ear and mastoid cells; coagulated in one m. ear.
F.	49	Lobar pneumonia	All healthy.
M.	60	Chronic interstitial nephritis and phthisis	All healthy.
M.	61	Ch. interstitial nephritis	All healthy.
M.	46	Lobar pneumonia, with pneumococcal septicæmia	All healthy.
M.	75	Lobar pneumonia	Sphenoidal contained a little thin semi-purulent material. R. ear and mastoid cells contained pus. Left mid. ear, thin watery pus (diplococci).
M.	43	Uræmia	Left sphl., some clear brownish fluid (staphylococci).
F.	36	Puerperal pyæmia	Right antrum of Highmore contains some brown fluid.
M.	6 mos.	Ch. hydrocephalus	All healthy.
F.	80	Septicæmia staphylococcal	Right sphl. contains brownish fluid (staphylococci).
M.	48	Aneurysm of aorta	All healthy.
M.	75	Lobar pneumonia and ch. int. nephritis	All healthy.

Sex.	Age.	Disease.	Sinuses involved.
M.	40	Cerebral hæmorrhage and ch. nephritis	R. and l. sph., clear fluid.
M.	40	Ch. phthisis	Left mid. ear contains fluid.
M.	?	Cerebral hæmorrhage	Both ethmoidal, polypi; sphen. same; others normal.
M.	15	Enteric fever	R. and mid. ear contain pus; temporal bone decidedly hyperæmic (staphylococci), and some large fat bacilli.
F.	65	Bhoncho-pneumonia	Sphen. full of choleste atomatous material; purulent in floor of sinus.
M.	10	Cystic sarcoma of pitintary body and cerebellar abscess	Ethmoidal cells contain fluid. Memb.
F.	40	Cerebral hæmorrhage	All healthy.
M.	68	Gangrene of lung	All healthy. Three sphenoidal sinuses, all communicating with nose; middle very small.
F.	38	Empyæma and septic peritonitis (septic pulmonary infarets)	Ethnoidal cells contain fluid. Memb. dark in colour. Fluid found reminded one of fluid in two cases of gangrene of lung.
M.	64	Hemiplegia	All healthy.
M.	58	Carcinoma of prostate	All healthy.
M.	39	Empyæma	All healthy.
M.	37	Malignant disease of intestine	All healthy.
M.	10	Acute infective osteo-myelitis (staphylococcal septicæmia)	All healthy.
F.	31	Puerperal septicæmia	All healthy.
F.	40	Chronic nephritis and uræmia	All healthy.
M.	23	Fracture of skull	Sphenoidal (traversed by fracture) contain blood. L. mid. ear and antrum traversed by fracture and contain blood.
M.	39	Ch. nephritis, and hæmorrhage into	Some fluid in left ethmoidal; others healthy.
M.	49	Double lobar pneumonia	Right mid. ear contains semi-purulent fluid full of pneumococci; all others healthy.
M.	24	Pyæmia and double empyæma	Attached to inner wall there is a dark polypus in frontal sinus (left). Antra of Highmore both contain pus.
M.	35	Ch. int. nephritis	R. mid. ear and mastoid antrum contains pus. Bone in attic dark-coloured. All sinuses healthy.
F.	49	Ch. int. nephritis; uræmia	All healthy.
F.	23	Acute miliary tuberculosis	R. sphenoidal is divided into two compartments by an almost complete transverse partition; all healthy.
M.	71	Endocarditis and lobar pneumonia	R. ethmoidal sinus contained polypus, size of an almond; all others healthy.
M.	19	Lymphadenoma and septic broncho-pneumonia	Frontal contains clear viscid fluid (streptococci, diplococci, and bacilli.
M.	64	Gangrene of lung	Left ethmoidal cells dark in colour, and lining membrane same. Sphenoidal contain fluid; r. dark and foul; left clear; bone dark in colour; contain bacilli, streptococci, staphylococci, and diplococci (not unlike pneumococci).
F.	47	Acute tuberculosis	L. sphenoidal divided into an upper and lower compartment by a horizontal partition; upper free from pus; lower full of thick, yellow pus. No t.b. diplococci (like pneumococci).
M.	65	Epithelioma of tonsil (septic broncho pneumonia)	R. sphenoidal contains some clear, brownish fluid; mid. ear and antrum contain some (streptococci, staphylococci, and diplococci).
M.	41	Pneumonia	Sphenoidal contained pus; all others healthy.

Sex.	Age.	Disease.	Sinuses involved.
M.	52	Malignant of bowel	All sinuses healthy.
F.	69	Meningitis	All healthy.
F.	21	Cerebro-spinal meningitis	All healthy.
M.	44	Lobar pneumonia	Right frontal sinus, thin, yellowish pus; pus contained pneumococci.
M.	26	Chronic phthisis	All healthy.
M.	68	Pneumonia	All healthy.
M.	48	Pneumonia	
M.	32	Mixed acute and chronic nephritis	All healthy.
M.	62	Pneumonia	All healthy.
M.	56	Lobar pneumonia and nephritis	Sphenoidal full of clear fluid; all others healthy.
F.	17	Cerebral abscess	Frontal, antra, ethmoidal, and sphenoidal all full of pus. Middle ear and mastoid cells healthy. Right lateral sinus contained septic thrombus; left, healthy.
M.	?	Epithelioma of upper jaw	All healthy.
M.	74	Pneumonia	Both frontal, both ethmoidal, and sphenoidal contained pus. Left middle ear and mastoid antrum, pus. Right antrum of H., pus.
M.	40	Gangrene of lung and pneumonia	Ethmoidal and sphenoidal cells dark in their lining, and foul-smelling; no distinct collection of pus; all others healthy. Right mid. ear, thick, yellow pus.
—	—	Lobar pneumonia and empyema	All healthy. Frontal absent.
F.	28	Ulcerative endocarditis	All healthy.
M.	73	Enlarged prostate and pyelo-nephritis	All healthy.
M.	44	Chronic phthisis	All healthy.
M.	60	Staphylococcal septicæmia and supp. pyelo-nephritis	Sphenoidal contained thick, yellow, purulent material.
M.	22	Lobar pneumonia	Left ethmoidal and sphenoidal contained semi-purulent polypoid tissue.
M.	45	Lobar pneumonia, with pneumococcal septicæmia	All healthy.
M.	50	Pneumococcal septicæmia	Sphenoidal contained blood-stained, purulent fluid (proteus and pneumococci).
M.	48	Tuberculosis of lungs	Blood-stained fluid found in l. frontal, both ethmoidal, r. mid. ear, and cells.
		and intestines	Sphenoidal contained clear fluid; others healthy.
M.	3	Fracture of skull	Left frontal contains a little polypoid tissue and pus, and both ethmoidal same. Sphenoidal full of thin, dark fluid. Mid. ear contained a little blood.
M.	58	Broncho-pneumonia	All healthy.
M.	39	Tuberculosis of lungs and intestines	All healthy.
M.	60	Ch. interstitial nephritis	All healthy.
M.	49	Tuberculosis of lung (empy. and lardaceous dis.)	Thin pus in left mid. ear and antrum. Both antra of Highmore contained same pus.
F.	24	Puerperal pyæmia	All healthy.
F.	39	Ch. phthisis (tubercular ulceration of bowel and peritonitis)	All healthy.
F.	10	Ch. phthisis; tub. meningitis (tub. disease of sphenoidal sinus and mid. ear)	Sphenoidal contained some yellow pus (streptococci, staphylococci, and tub. b.). Left mid. ear, pus (tub. bacilli).
M.	63	Carcinoma of stomach, liver, and intestines	Left mid. ear contains some pus; also mastoid antrum. Others healthy.
M.	17	Lateral sinus thrombosis	Sphenoidal sinus contains clear fluid. Right mid. ear, antrum, and lateral sinus contain pus. Internal jugular vein in neck is quite healthy. Temp. bone has a dark appearance (diplococci, probably pneumococci).

Sex.	Age.	Disease.	Sinuses involved.
M.	50	Enteric fever	All healthy.
M.	13	Acute infective periostitis and staphylococcal pyæmia and septicæmia	Sphenoidal contains pus; both cavernous sinuses are full of pus; antra of Highmore contains pus, with necrosis of alveolar border; pus contains staphylococci. aureus—right middle ear, thin, yellow pus; abscess in temporo sphenoidal lobe.
M.	25	Acute miliary tuberculosis	Sphenoidal thin sero-purulent fluid. No t.b. (streptococci); other sinuses healthy.
M.	43	Fracture of skull	Both sphenoidal, sero-purulent fluid; other sinuses healthy.
F.	17	Pelvic abscess	All healthy. Right frontal absent.
M.	49	Gall-stone (ulceration of duodenum and septic cholangitis)	All healthy. Mid. ear contained a little bile-stained fluid (patient was deeply jaundiced).
F.	56	Fracture of base of skull	R. sphenoidal contained some blood and polypoid tissue; the left, pus and polypoid tissue. R. mid. ear contained blood, due to fracture of petrous bone.
M.	6 mos.	Gastro-enteritis	All healthy.
M.	48	Lobar pneumonia	All healthy.
M.	—	Acute mercurial poisoning	R. sphenoidal contains polypoid tissue. Left mid. ear and mastoid cells contained blood.
F.	21	Septic endometritis, salpingitis, and peritonitis	All sinuses healthy, with the exception of the left frontal, which contained a small polypus, about the size of a split pea.
M.	31	Enteric fever and lobar pneumonia	The bone over and around both middle ears was hyperæmic; the rest of sinuses all healthy.

Discussion.

The President congratulated Dr. Kirkland on his most interesting and practical paper. As bacteriology enters so largely now-a-days into the elucidation of all such conditions as this, the clinical study of sinus suppuration cannot be considered complete until all the light that examination of the discharges can throw on the nature of individual cases is systematically carried out. Suppuration of these sinuses, especially the frontal ethmoid and sphenoid, is at times so notoriously intractable and hard to control that all help which the surgeon can obtain from every source should be gladly welcomed and eagerly taken advantage of. Clinical experience, supported by post-mortem verification, points to a probable anatomical communication between one or more of these cavities in many cases, and when a given case becomes tedious and difficult to cure, this connection should never be lost sight of as a possible explanation of the condition. *E.g.*, if an empyema of the maxillary sinus persists after this cavity has been thoroughly explored and treated, the intercommunication between it and the frontal or ethmoid sinuses should suggest a careful exploration and direct treatment of these more remote cavities.

Dr. Barrett said that the paper opened up the problem of the proper method of dealing with a chronic suppuration of the middle ear. On this subject his views had undergone considerable modification. As a matter of experience, he had become aware of the comparative innocuousness of a suppurating ear. He did not advise anyone to neglect such a condition, any more than he would advise anyone living in a wooden house to fail to pay their fire insurance premiums. Nevertheless, in an extensive hospital practice at the Victorian Eye and Ear Hospital, with considerable neglect on the part of patients, the presence of suppurating ears was rarely associated with disaster. On the other hand, the attention of the profession had been so forcibly directed to the danger of neglected suppuration that the treatment was much more efficient than formerly, and that possibly accounted

for the largely reduced number of operations performed for acute mastoid symptoms. At the Eye and Ear Hospital, as a matter of routine, he followed the adoption of an antiseptic method, viz.: the careful cleansing of the ear, and the instillation of antiseptic substances, followed by complete drying and packing with gauze or powder. Of the various antiseptics used, he had been more successful with carbolic acid lotion from 1 in 15 to 1 in 20. The meatus was filled with this solution, and it was retained for from fifteen to thirty minutes. His experience had been that the great majority of suppurating ears had been cured by this method of treatment. For the residium, those which continued to suppurate, or the very small proportion which developed acute symptoms, some form of operative proceeding was necessary. For those cases in which an operation was one of election, he preferred to practice an ossiculectomy in the first instance, and to reserve finally for the most obstinate cases a complete dissection of the antrum and tympanum. It was comparatively rarely that he had to follow this course. Whether his explanation was right or wrong, the fact remained that in Melbourne aural pyæmia had become a rare disease. It was not so ten years ago.

A FACTOR IN THE DIAGNOSIS OF HEREDITARY SPECIFIC INTERSTITIAL KERATITIS.

BY

M. J. Symons, M.D., Adelaide.

For several years—fifteen or more—I have been in the habit of examining the configuration of the tibia in cases of interstitial keratitis, so far as an examination can be made by running one's fingers along the anterior ridge of the bone.

My attention was first called to this locality by the fact that nodes are found to be present at the middle of the shaft.

As time went on, and cases multiplied, there was borne into my mind the occurrence of an unusual forward curving of the bone, at or about the middle of the shaft.

That this condition was present in the great majority of cases, and that its presence might be taken as a factor in the diagnosis of interstitial keratitis, I searched the literature bearing on the subject of hereditary syphilis within my reach, but failed to find, even in Hutchinson's classic work ("Clinical Memoir," 1863), any reference to this point.

In association with Dr. Claude Cooper, late House Surgeon at the Adelaide Children's Hospital, a further library research into the more recent literature on the subject of hereditary syphilis was made, when we found that the point was touched upon by Rose and Carless, as follows:—"A symmetrical overgrowth of the tibia, perhaps combined with anterior curvature, also occurs in syphilitic children, resulting in permanent elongation of the legs."

Again, Tubby, on "Deformities," refers to "anterior curvature of both tibiæ, nearly symmetrical, affecting the middle rather than the lower third in hereditary syphilis," thus distinguishing it from the rhachitic bone. Indeed, this peculiarity of the bone is well known as sabre-shaped tibia.

Notwithstanding the earlier publication of the point engaging our attention, we continued to sift the matter. This led to the production of X-ray photographs of the tibiæ of subjects of interstitial keratitis, and of camera photographs of presumably healthy bones.

Twelve of each are offered for your inspection. The hereditary specific bone shows an exaggerated curve about its middle, not extending to the lower one-third, suggesting the shape of a boomerang, while the healthy bone shows a gradual forward curve of the whole shaft, from just below its upper to just above its lower extremity.

This matter is not brought before you with a view to claim credit for a new discovery, but simply to draw attention to the frequent co-existence of boomerang tibia, with interstitial keratitis, in the hope that the presence of the former may aid in the diagnosis of the latter.

In the absence of the usual signs of the syphilitic diathesis, the acceptance of a further guide to its diagnosis, asserts a value of which we may well take cognizance.

In two recent cases in which the ordinary signs were absent, this factor has been of service to me from a diagnostic point of view:—

(1) A case of traumatic superficial keratitis of the lower third, in which after the opacity had cleared up, there was a marked diminution of vision, and the central area showed a ground-glass opacity.

(2) A case of trachoma, with vascular pannus; later, the whole cornea became highly vascular, and a suspicion of interstitial keratitis was entertained.

In both cases there was the boomerang tibia, and each case responded rapidly to the recognised treatment of interstitial keratitis.

THE PROGNOSIS AND TREATMENT OF SYPHILITIC DISEASES OF THE EYE.

BY

ROLAND POPE, M.D., F.R.C.S.E.

WHEN I was honoured by an invitation from the honorary secretaries of this Section to open a discussion on the subject of the Prognosis and Treatment of Syphilitic Diseases of the Eye, I accepted it with great misgivings as to my ability to do justice to so varied and important a paper. I would therefore crave your indulgence for my shortcomings, and as, after all, the great value in this instance lies in the discussion, and not in the opening of the subject, I hope you will pardon my omissions, and when rising to join in the discussion, kindly fill them in for me. By so doing, and by our working harmoniously together, we shall be most likely to attain the object of our meeting and discussion, viz., the throwing some further light, if possible, on the treatment of syphilitic eye disease and its prognosis.

It is my intention to make this paper brief, to pass but lightly over the common and simple conditions of the eye which, as local manifestations of a constitutional disease, require but a systematic course of treatment by one or other of the usual methods ; such, then, as chancre of the eyelid, secondary skin eruptions of the lids, gumma of the lid or orbit, or other tertiary manifestations, will not be considered, as these, when diagnosed, do not call for any other than the blandest of local treatment, while the general treatment is being carried out, and their prognosis is good on the whole. I shall also pass over the cases of nerve and muscle paralysis, such as third nerve implications of the eyelids (ptosis, &c.), extra-ocular muscles and of accommodation, also of other nerve lesions of a syphilitic origin. So that I now come to what appear to me to be of far greater importance for the scope of this paper, viz., those cases of ocular and intra-ocular eye disease of specific nature, such as affect the cornea, iris, ciliary body, choroid, retina, optic nerve, the media of the eye, vascular and perivascular changes in the fundus, &c. It is on these conditions, then, that I wish to make a few remarks, and especially by them to elicit from you all your views, and the results of your valuable experience.

For the purposes of prognosis and treatment under discussion, it seems undesirable to attempt any classification of cases, such as congenital and acquired, primary, secondary and tertiary, &c., but just to treat of them as such when they occur throughout the paper.

Commencing with the cornea, I shall ask you to bear patiently with me for a little, while I touch upon some points in the *prognosis* and *treatment* of that disease, interstitial keratitis, with which you are all so familiar. Taking an ordinary case in a boy or girl, such as is so commonly met with from the ages of seven to seventeen, the *prognosis* is, in perhaps the majority of cases, good; but as there are a great many cases in which the attack proves to be of far greater severity than would be expected at the onset, and as in some cases the disease implicates the iris and choroid, disseminated choroiditis usually, while in one of my patients a very severe attack was followed by optic atrophy, we must be very guarded in our prognosis, and, further, not omit to mention the great probability of the other eye becoming attacked, and that even when the patient is well under treatment. In young adults of twenty years of age and upwards, the *prognosis* is, in my experience, more generally favourable, and the disease is more likely to be confined to one eye than in boys or girls. It should be noted, however, that sometimes, though only in a small percentage of cases, a second attack may occur several years after the first attack.

I have had one or two such cases. We may say then that the *prognosis* of interstitial keratitis, both in regard to the density of the corneal opacity and to any involvement of the iris and choroid—as these are the important factors in regard to the visual result—depends upon the severity of the attack, and appears to be generally more favourable with increasing years of age.

In regard to the *treatment*, as we are, of course, only considering the cases of a specific nature, I shall not discuss the point as to whether the greater number of cases have or have not a syphilitic origin, and shall only mention a few points as to treatment of specific cases.

Here, in addition to general or systematic treatment, which is of paramount importance, *local treatment* of the eye is called for in practically every case, and solution of sulphate of atropine, 4grs. to the ounce of distilled water, should be instilled into the eye every four or five hours whenever there are any signs of ocular irritation in the case.

For *general treatment*, in very young patients, the internal administration of 1gr. of the hydrag. cum cret., combined with 2 or 3 grs. of saccharated carbonate of iron, in powder form, three times daily, answers very well, and the addition of the syrup of the iodide of iron is sometimes useful; while for those older the same mercurial salt in pill form suits admirably. Both eyes should be protected from excess of light, and here I would venture the opinion—judging from my own practice, that unless in very exceptional circumstances, with absolute intolerance to light—that we will do our patient more harm than good, thus defeating our own object, by ordering the case to a dark room for perhaps two or three months, as has formerly been much practised. Fresh air, with mild open-air exercise, the eyes well protected from the light by dark glasses and cardboard or brown-paper shades; for city patients a change to the country, and for country patients to the sea-side—in some suitable cases a long sea voyage—are of inestimable value during the long course of treatment necessary, and I can strongly recommend the practice, during the convalescence from the attack, of continuing for two years or more the administration of one pill daily, preferably at the midday meal, of Hutchinson's compound pill, while at breakfast and the evening meal a tonic mixture of iron and quinine, or strychnine, ammonia and bark, "Pil.: Blaud," or the like, until the patient is in the most robust health, when only the mercurial pill need be continued until the two years or thereabouts of treatment is up. It has so frequently been my experience that, as a result of the long course of mercurial treatment combined with the tonics, the patients have improved remarkably in colour and appearance, gained weight, and are altogether enjoying vastly better health than they have for years previously. I have omitted to mention that in the acute stage of the disease it will be necessary sometimes to resort to counter irritation in order to bring relief to the patient, such as blistering the temples, or the useful though old-fashioned seton to the back of the neck. Leeches to the temple will often be found valuable also. The same remarks may be applied to the somewhat rare cases of scleritis and sclerotising keratitis (the corneal infiltration having extended from the scleritis), which have a specific origin, but the prognosis as to the clearing of the corneal opacity is not so favorable.

The opacities of the cornea following interstitial keratitis usually entirely clear up in time by nature's process of repair, but this may be aided, as is well known, by the use of Pagenstecher's ointment. The more densely white the opacity, the longer the time necessary for its absorption, even to five to ten or more years, and the *prognosis* should be given accordingly. With this ointment, or, where too stimulating or irritating, with mercurialised lanoline, the "Lanoline Hydrargyrique" of Darier (equal parts of lanoline and metallic mercury well mixed together), massage of the cornea through the lids

materially assists nature's process of absorption of the opacity; and electrolysis, in one or other way, has been recommended, but not largely adopted.

Syphilitic iritis, in addition to the routine *treatment* for iritis (atropine, leeches, constitutional treatment, &c.), calls for a special reference to the great importance and urgency of pushing the mercurial administration as early and rapidly as possible. Though there is usually less pain and acute inflammation in these cases than in rheumatic iritis, there is a tendency to much greater serous effusion or exudation; consequently the sight is much more endangered from the media being rendered hazy. In the early stages, salivation or the loss of a tooth or two, if unavoidable, should not be taken into account when the sight of an eye is in danger. The importance of rapidity of action of the drug (in addition to the use of atropine) is well exemplified in the prevention of posterior synechiæ. The *prognosis* in syphilitic iritis is in most cases good; recurrence is extremely rare; but we must be guarded if there has been much exudation when we first see the case, owing to deposits on the anterior capsule of the lens, &c. An instance occurs to me of inherited syphilis affecting the iris in each eye primarily (to outward appearance), in an infant about *five months* old, in which, when the iritis had subsided after treatment, the entire vitreous in each eye was found to be so densely infiltrated that no view of the fundus could be obtained, and in one eye this has not yet (four or five years) been so, owing to secondary cataract intervening; while in the other eye the vitreous cleared up entirely in a couple of months, and revealed the fact that the whole uveal tract, iris, ciliary body and choroid, and with this the retina and optic nerve, had participated in the general disturbance. The optic nerve showed a remarkable degree of effusion in and around the nerve head, and when this had subsided, the usual result of post-neuritic atrophy was noted. How guarded then the *prognosis* in this case, which began as an aritis, with specific history (inherited), and ended in total blindness of one eye, and only perception of light in the other.

This brings me to the *prognosis* and *treatment* of intra-ocular diseases specific in origin, such as hyalitis, choroiditis, retinitis, disseminated chloroiditis, &c. These cases are serious, but very much less so than when due to other constitutional causes, or when idiopathic, as it were. The most important point in the *prognosis* is the duration of the attack (which may be anything from a few months to a year or two before completely quiescent), and the amount of damage done by the attack to the all important structures, media, retina, chloroid, optic nerve, &c., concerned in the function of sight. Thus the *prognosis* is decidedly serious, though in some few cases the attack proves amenable to treatment, and good results are obtained.

In regard to the *treatment* of these syphilitic diseases of the eye, both intra-ocular and of the various coats of the eyeball, I trust I may be pardoned for expressing the opinion that it is in its infancy as to the best method of administration. That mercury and iodide of potassium, or some substitute for the latter, with similar action but less inconvenience, are necessary in every case has been proved to me by experience so far, but the question which besets us is the mode of administration of the mercury. When shall we find out whether exhibited by the mouth, in the form of a biniodide mixture with or without the inclusion of perhaps some tincture of nux vomica, for example, as a counteracting tonic; or the Hutchinson's compound pill, or other form of mercurial pill, taken in conjunction with the iodide of potassium mixture (or its substitute), the latter taken half an hour before meals, the former at the end of the meal; or the inunction of mercurial ointment used nightly; or the hypodermic injections of the bi-cyanide of mercury, 1 in 1000 solution, three times weekly; the similar application by the intramuscular method; and last, but not least, and possibly in the future to be the first and best method, the intravenous injection of one or

other of the mercurial salts in solution? When shall we find out the most valuable and the best all-round method of administering this powerful drug, mercury? It will be said in reply that each case must be considered on its individual merits, and that method pursued which seems best adapted in each instance. So far so good, but in the cases that do not respond quickly to the method used, is there one to which we may have recourse with more confidence than any other? I believe there is, and that is by the combination of the injection method *locally and generally;* by that I mean subconjunctival injections of the bi-cyanide, 1 in 1000 or 2000 (the quantity differing accordingly from 3 or 4 mm. to ½ dr. or 1 dr., two or three times weekly, combined with the hypodermic, intramuscular, or intravenous injections. Taking these latter three methods, I cannot speak from experience of the intravenous, though highly impressed with its value, from theoretical reasons, and from the literature on the subject, but I have learnt from practice, in a few cases, and from following up cases under Abadie of Paris, the superiority of the other two over inunction or administration by the mouth. A point usually urged in favour of inunction or injection against exhibition by the mouth, is that in some cases mercury is not borne well by the alimentary tract, and rightly, and a further point is, that it is a great advantage, while using inunction or injections, to be able at the same time to be administering iodide of potassium by the mouth, or tonic treatment to build up the constitution and counteract any ill effects of the mercury, such as we know not infrequently occur, *e.g.*, anæmia, &c. With reference to subconjunctival injections, constituting local treatment in ocular and intraocular diseases of a specific nature, I look upon them as not only a valuable adjunct to the general treatment, but in most cases of paramount importance in obtaining that most to be desired of all effects, rapidity of action of the drug, for the application, being made so close to the seat of disease, becomes the first and a powerful factor in arresting, as far as is possible, the damage to the delicate structures of which the eye as the organ of sight is made up. Thus I have, in many cases, seen the acute stage of a specific irido-choroiditis, or of a choroido-retinitis, very markedly shortened, and the sight rapidly clear, to the gratification of the patient and the surgeon, and it only remains to continue the general treatment, though this is for a prolonged period. With scarcely an exception, two years at least of this general treatment are advisable, and, to prevent relapse and secure permanent recovery, necessary, in which ever method of administration is adopted. I shall not trouble you by quoting authors and their works on these subjects; it is not within the scope of this paper, and I think our object is better attained by giving our own practical experience, and thus creating discussion on the points in which our experience either differs or proves to be similar.

I should perhaps mention a point in regard to an advantage held by the injection method over that of inunction; it is that, while in hospital indoor practice we can be certain that the ointment in right quantity will be regularly used, we cannot be so in most cases in private practice, and, further, in all probability no two patients would be exactly alike in power of skin absorption, regularity and correctness of application, &c., so that dosage would be a very irregular quantity, from obvious reasons, when inunction is practised by different individuals; whereas we make sure of giving all our patients exactly the amount of the drug we wish to when the injection method is used, and at the precise time. Inconvenience and expense are disadvantages in private practice of the injection method. In carrying this out. I have used any good form of hypodermic syringe, armed with platino-iridium needles, both for sub-conjunctival and hypodermic injections. These needles are best sterilised by holding in the flame of a spirit-lamp for a few seconds, when they become red to white hot, and thus

prevent the introduction of anything septic. A drachm of the bi-cyanide solution (1 in 1000), injected into any of the suitable parts of the back or buttock three times weekly in the early and acute stages, and twice weekly for prolonged continuation, is the system usually adopted.

Subconjunctival injections have been opposed somewhat on account of the pain and reaction (conjunctival) they cause, but, recently, the discovery of some new drugs in the form of acoïn, dionine, adrenalin (supra-renal extract), has enabled these injections to be made practically painlessly, these drugs being vaso-constrictors and analgesics. Dionine, by instillation, is reported very serviceable in relieving pain in some deep-seated diseases, as iritis, cyclitis, irido-choroiditis, &c.

I have intentionally omitted any mention *seriatim* of the different varieties of fundus, &c., disease, in regard to their prognosis and treatment, such as macular, optic nerve, vascular, other choroidal and retinal changes, diseases of the vitreous, &c., as the treatment will be on the same general lines as above described; while the prognosis, in addition to the points already mentioned, only calls for the self-evident remark that it is very much more grave where the macular itself, the optic nerve, or other vital structure concerned in the function of sight is involved in the morbid process.

To sum up, then, I would say that the prognosis of syphilitic diseases of the eye is, as a rule, much more favorable than in similar diseases of other local or constitutional origin, though it must be in all cases guarded; and that it depends on the severity of the attack, the particular structures involved in the attack, and the amount of damage done or likely to result from implication of these structures.

The treatment will be local and general, and I would lay particular stress on the value of complete rest for the eye, subconjunctival injections of the bi-cyanide of mercury combined with general treatment by one or other of the methods of administering mercury—our sheet anchor in specific eye disease—and, above all, of obtaining, by every means in our power, the utmost rapidity of action of the drug, in order to prevent as far as possible any damage to the structures concerned in the function of sight; and last, but not least, the continuation for two years or more of the general treatment, the method to be preferred being, where possible and convenient, by hypodermic, intramuscular, or intravenous injection.

Discussion.

Mr. A. L. Kenny said the decision as to the form in which mercury may be most successfully administered must depend upon the individual case. The speaker found inunction to be the most powerful of the methods he had used. He had no personal experience of hypodermic injection of mercury, and was not tempted to try it. The hypodermic administration of pilocarpine greatly enhanced the good effects of mercury, and with a rather prolonged experience of its use he had failed to observe any undue depression—he usually commenced with $\frac{1}{10}$ grain. Adrenalin gave marked assistance in the acute and chronic congestive forms, depleting the superficial vessels, and allowing atropine to act more quickly and effectively. He agreed as to the advantage of atropine ointments over atropine solutions. Members should not lose sight of the necessity for an examination of the urine when it was proposed to push the administration of mercury. If a speedy salivation were required, he preferred calomel 1 gr., with $\frac{1}{4}$ or $\frac{1}{3}$ gr. of pulvor extract opii, three or four times in the twenty-four hours. He had found it impossible to induce his patients to use the strength of yellow oxide of mercury ointment, ordered by Pagenstecher; he prescribed 1 gr. of the amorphous yellow oxide of mercury to 1 oz. of vaseline or vaseline and

lanolin mixed, and ordered a piece the size of a split pea to be inserted under the eyelids at bedtime, and the eye to be well massaged through the lids.

In his experience there were cases of disseminated choroiditis that were not specific (Mr. Jonathan Hutchinson had already noted this), although they were formerly assumed to be specific. The acuity of vision in some of these cases was surprising—he knew of one which, with a small concave correction, had and still maintained 6/5 in each eye, and Jaeger 1. He advised guarded prognosis, more especially the deeper-seated the lesion.

In some cases of interstitial keratitis he had found that attention to intranasal derangements greatly assisted the ocular and general treatment.

Dr. Pockley said he would be glad to hear of the practice of those present as to their methods of administering mercury. It used to be considered by the English school that there was no advantage in subconjunctival or hypodermic administration, and that it had the drawback of necessitating the attendance of the patient with a fee each time. He found that he could get the patient very rapidly under the influence of the drug, with tenderness of the gums, in forty-eight hours or less by the administration by the mouth of calomel in minute doses, $\frac{1}{12}$ gr. every hour—a method just brought under his notice by Dr. Lindo Ferguson.

As to the prognosis of syphilitic eye disease, each case had to be considered on its merits. Generally one might say that the deeper the disease the more unfavorable the prognosis. For instance, interstitial keratitis generally did well; so did iritis, as a rule, if properly treated from the first. Vitreous opacities and retinitis were less certain, and choro-retinitis and choroiditis always left permanent damages. One had always to be careful, even in a case of apparently uncomplicated interstitial keratitis, because after it had cleared away one sometimes found choroidal atrophy, and if, as occasionally happened, this were in the macular region, sight would be seriously damaged.

Another point was the necessity of caution in prognosis in cases of slight traumatism of the cornea in congenital syphilitis, as even a simple abrasion of the cornea sometimes lit up an attack of interstitial keratitis in those so disposed.

With regard to the opacities frequently remaining after interstitial keratitis, he had found electrolysis very effective in clearing the cornea, and instanced one case in particular in which he and two other ophthalmic surgeons had given the decided opinion that the opacity could always remain, but which, on the earnest solicitation of the patient, he had treated by this method, with the result that after twelve months' treatment the opacity had almost completely disappeared. Weak circuits, $\frac{1}{6}$ milliampere, should be used.

Dr. Kenny had said that he found patients could not stand the Pagenstecher ointment stronger than 1 gr. to 1 oz. He could not understand this, as he used it from $\frac{1}{2}$ to 1 gr. to the drachm. In the Prince Alfred Hospital pharmacopœia the formula was 1 gr. to 1 dr., and there were few complaints. Perhaps the quantity used explained the difference. He (Dr. Pockley) told the patient to use a morsel half the size of the head of a wax match.

Dr. Kenny had mentioned cases in which he was satisfied patients had not had syphilis. He (Dr. Pockley) could never satisfy himself that a patient had not had syphilis. He had found it in cases in which it would never have been suspected. Syphilis was sometimes contracted in an "irregular" way, and in his experience these were the cases that, when they got eye affection, got it in the severest and most intractable form. He recalled several such cases.

Dr. Hogg said that he was very much interested in the subject of "Syphilitic Diseases of the Eye," as he had had a number of such cases under

treatment in the last few years. Passing by the question of interstitial keratitis, he would deal only with the deeper affections of the eye met with in secondary and tertiary syphilis, and in such cases the prognosis was, to his mind, anything but the favourable one advanced by some of the speakers. He had had some twenty or thirty cases under observation in the last few years, and he regretted to say that his experience had not been a very happy one. Dr. Pope, in his able paper, had stated that syphilitic iritis rarely recurred. In the speaker's experience relapses were frequent, and the iritis was often associated, sooner or later, with deeper disease in the eye.

With regard to cases in which the choroid and retina were affected, there were several different forms of disease, with a varying prognosis:—

(1) Diffuse choroido-retinitis, with its fine vitreous opacities, opaque retinæ, whitish-grayish spots, reduced accommodative power, night blindness, &c., yielding to treatment, only too frequently to relapse, in spite of all treatment, the attacks having unfortunately greater or less permanent change, with a corresponding amthyopia.

(2) Central choroido-retinitis, in which the macular region is most affected, and central vision suffers.

(3) A form of intense retinitis, with diffuse hæmorrhage, which may go on to hæmorrhagic glaucoma even, and in which the prognosis is anything but favourable.

(4) An endarteritis obliterous of the arteries of the retina, in which plugging of vessels and consequent hæmorrhage may occur. For this change treatment is of little avail.

On the whole, therefore, he regarded such forms of syphilitic disease as dangerous, even when amenable to treatment, very liable to relapse, and sometimes pursuing a progressive course over which the surgeon could expect but slight control.

As to treatment, he used mercury in different forms, and usually pushed the administration to begin with. On the whole, he preferred inunction, for a time, at any rate; sweating by means of Turkish baths was sometimes a valuable adjunct. Iodide occasionally did good when mercury failed, and it was often useful after a course of specific treatment to resort to general tonics, iron, strychnine, &c.

The President, in referring to Dr. Pope's statement that "in some cases of interstitial keratitis the disease implicates the iris and choroid," asked the question, "Is not this so in all cases?" If syphilis is, as we believe it is, a systematic poison, will it not, when it affects an organ like the eye, most likely attack a vascular structure, such as the uveal tract, before non-vascular parts, like the cornea? It seems quite reasonable and probable that such is the sequence of events in every case, and that interstitial keratitis is really a manifestation of a disease which from the start affects the whole uveal tract to a greater or less degree. Hence the importance of using atropine from the first. We know that nothing is more common than to observe patches of choroiditis in eyes which have suffered from interstitial keratitis, and the reason for this is obvious, and just what one would expect. If the disease, then, be regarded as an irido-cyclitis, it is *a priori* just as likely that the inflammatory changes may extend backwards as well as forwards, and such we find is in accordance with clinical observations in these cases. When it goes backward, the choroidal changes are more marked than the corneal, and conversely when it travels forward the cornea is more affected than the choroid. The presence of vessels in the cornea is an important diagnostic sign in these cases, as it affords the readiest means of proof that a certain eye has suffered from this disease at one time. Hirschberg, who first described these deep vessels (Deut. Med. Wochenschr., 1888), says that the non-dichomotous variety is peculiar to the specific form of keratitis, and that, once formed, they persist

throughout life. They may become degenerated to mere threads, yet it is astonishing to see with what rapidity an eye in this condition may, on very slight injury, become acutely inflamed, and in the course of even a few hours may be in the condition of an advanced form of vascular keratitis. This can only be explained on the supposition that the vessels are really still present, and can become functionally active after sufficient stimulus has been applied. Examination of a large number of eyes which had been the subject of interstitial keratitis, in the speaker's clinique, did not quite bear out the correctness of Hirschberg's observations as to the kind of vessels found in the cornea. Both dichomotous and non-dichomotous vessels were found, and those running horizontally belonged for the most part to the former, and those running vertically to the latter, or the besom-like variety. One other observation was made in these examinations: it is necessary, in order to correctly classify the vessels, to carefully focus the vessels with your mirror, for, as they lie in different planes of the cornea, if great care be not exercised, vessels which, from their position in relation to each other, might readily be assumed to be dichomotous, and belonging to the same group, when really they are non-dichomotous, and belonging to separate groups, superimposed one on top of the other. In this connection, and as a now well-recognised method of treatment recommended by Stephenson (B.M.J., Sept., 1896), electrolysis of the patches of infiltration left after interstitial keratitis was referred to. That this treatment does aid the absorption and thinning of such opacities of recent formation is beyond dispute, the practical effect of the treatment being a powerful stimulation of the part treated, and if the opacity is due only to an area which is infiltrated by inflammatory products, no doubt the lymph stream in the cornea is hastened, and this leads to the carrying away of those products which are deposited between the bundles of the fibres. The good resulting from this treatment must necessarily have its limits to conditions such as those described, and it cannot be expected to convert the scars left after ulceration—as some say it does—into healthy and transparent tissue. The yellow oxide of mercury ointment, with massaging the cornea, acts probably in the same way as the electrolysis by aiding the absorption of these infiltrated patches. It seems likely that the new nuclein preparation of mercury—mercurol—may supersede this orthodox preparation in these and other conditions of the eye, as it possesses the advantage of being non-irritating, and is supposed, in common with the other nuclein preparations, such as nargol and cuprol, to be more readily absorbed by the tissues. It is, moreover, an impalpable powder, and is therefore not gritty in the eye. This grittiness of the yellow oxide is sometimes complained of, even when the amorphous salt is used, and the ointment most carefully dispensed.

Regarding the prognosis as to vision, experience has taught the speaker that we should not hastily commit ourselves to any decided expression of opinion as to how much vision may be recovered, this especially in young subjects. In some cases—and one such was cited by way of illustration—even where the attack has been a very severe one, and the corneal opacity very great, it is astonishing what clearing up takes place in a few years.

In the treatment of syphilitic iritis by the use of pilocarpine combined with local depletion, atropine, and the exhibition of mercury, the most satisfactory results can now be obtained in rapidly reducing the inflammatory congestion of the iris, and in breaking down adhesions, and the pilocarpine largely contributes to these results. Subconjunctival injections of medicated fluids do not seem to have realised the hopes the originators of the treatment once entertained for them in acute inflammation of the iris, &c. The speaker has found as good results to follow the use of normal saline as of any mercurial or other solutions. In certain conditions injections of a 2

per cent. saline solution do facilitate the clearing up of an eye more rapidly and more effectually than any other treatment. They also possess the advantage of being painless and non-irritating; they do not leave behind adhesions of the tissues, and they can be repeated at very short intervals. Lastly, as to the exhibition of mercury: inunction—one of the oldest of all the methods of introducing mercury into the system—seems to be still the favourite method, and although the drug is more quickly absorbed when given by intra-muscular injection, still this method has not come into anything like general use. The speaker has found the sozoiodate the best and least irritating preparation for injections.

A CONTRIBUTION TOWARDS THE DISCUSSION ON THE SUBJECT OF "THE PROGNOSIS AND TREATMENT OF SYPHILITIC AFFECTIONS OF THE EYE."

BY

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Syphilitic affections of the eye are not common; at least, this is my experience here; and yet we meet with cases occasionally, which show that we should bear in mind this possible cause when we are called upon to consider the "prognosis and treatment" of some obscure affection of the eye that may be brought before us.

Syphilis may attack any portion of the eye, but it is only when the deeper structures are involved that serious signs and symptoms are found, even to loss of sight.

From generalities I now pass to some details of cases seen by me, which illustrate the points referred to.

The first case is one of iritis, which is one of the most usual manifestations of the disease met with in the eye. My patient was a married woman, suffering from considerable loss of vision and inflamed eyes. She was much debilitated, and had been under medical care, off and on, for some months previous to my seeing her. Her sight began to fail or get hazy at the commencement of her illness, and has not improved, but rather has been getting worse.

Upon examination, I found the lower portion of the cornea dotted closely with opaque, whitish spots, distributed in a triangular form, with the apex in the centre of the cornea. The cornea was hazy, and the iris seemed dull and thickened, and was sluggish in action. The ciliary zone was injected, and there was intense photophobia. The tension was increased, and the aqueous humor appeared turbid; there were no posterior synechiæ, nor other indications of a plastic iritis. The history was not clear as to syphilis, but appearances seemed to indicate this taint as being the cause of such a persistent condition of the eye. However, I resolved to treat the case as one having syphilitic origin, seeing that previous remedies of the usual character had not entirely relieved her. I gave her full doses of mercury for a week at a time, alternately with a week of iodide of potassium and hydriodic acid, and at the same time ordering tonics and strengthening foods. The prognosis in this case could not be very favourable, but yet I held out some hope of improvement. Within a month there was a decided improvement; the cornea had cleared, the iris could be seen to become more healthy, and the dread of light had almost entirely passed away. Her vision had improved accordingly, but not entirely. There was sufficient improvement, however, to show that the treatment was having good influence, which to my mind confirmed the opinion I had formed as to the syphilitic origin of the disease.

Another case, which was equally instructive to me, is that of a man aged thirty-eight, nearly blind in both eyes. This loss of vision had been gradually coming on during the past six months, previous to my seeing him. In this case there was a decided history of a syphilitic attack some three years previously, for which he had been carefully treated. The manifestation of the disease in the eyes had first appeared as a slight clouding of his vision, without any apparent cause to account for it. This occurred about eighteen months after he had become apparently well of the syphilitic disease, which was thought not to have had a strong hold of his system. However, the disease went on unchecked in the deeper structures of the

eye, as the loss of vision continued until he could not see sufficiently to do his usual work.

Ophthalmic examination revealed a hazy condition of the fundus—so much so that the vessels of the retina were partially obscured. The disc was almost indistinguishable from the density of the cloud in front of it. In fact, very little could be made out of the fundus, so obscured was everything by the haze.

With such a condition of the eyes as this, the prognosis could not be otherwise than unfavourable, as the damage done to the delicate structures of the back of the eye seemed irremediable. All one could possibly hope for in this case was to relieve the pressure on the retina by the absorption of the effusion causing the trouble, and thus bring about some amount of improvement in the vision.

In any case, anti-syphilitic remedies were indicated, but I could not promise the patient any improvement of his vision until the remedies had been administered for a length of time. This was done, and after about six months of a course of these remedies there was slight improvement in the vision—sufficient to encourage the patient in a perseverance with the remedies. And it was only after another six months of the remedies, which were changed from time to time, that a decided clearing up of the cloudy condition of the eyes occurred. Even then his vision was not free from haze, but he could see sufficiently well to go to work.

The cloud was still there in the fundus, but less dense, as the disc could now be distinctly seen, as also the blood-vessels.

The chief lesson, then, which I have gained from my limited experience with this disease, is that the prognosis is more or less favourable, according to the structure of the eye involved—provided that appropriate treatment be administered for a sufficient length of time to eliminate the poisonous element of the disease.

THE TREATMENT OF MIDDLE-EAR SUPPURATION.

BY

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I do not know of anything which induces profound conviction of the truth that there is nothing new under the sun than having to sit down and compose a paper on a well-worn medical subject.

To set out such a subject in a revolutionary light, one would require to be either a genius or to have the capacity for taking pains, which, if not genius, is at least a presentable substitute for it. Now, I am neither the one nor possess the other, and so must tread the beaten path of authority, bringing forth from my store only things old and familiar.

If I dogmatise, it is simply to evoke discussion, and I trust all my assertions are tempered with the humility born of limited experience. For my part, I shall gladly sit at the feet of the Gamaliels who will continue the discussion. That very wise surgeon, Sir William Banks, writes in last week's *British Medical Journal*:—"Nowadays, it is the man who appeals to experience who is considered the ass. The idea is that there is no time to attend to persons who mildly plead long experience as a reason why they should be heard."

Now, in the matter of respect for experience, I am a man after Sir William's own heart, however much I may admire the young bloods of to-day, whose papal attributes excite one's envy and amazement. And having thus, as I hope, disarmed criticism, as to my shortcomings, I will to the matter we have in hand.

The subject for discussion is the treatment of middle-ear suppuration other than the radical mastoid operation. I intend to limit my remarks in several ways. I am not going to touch on the treatment of acute suppuration, and I shall leave to others the question of operative procedures, such as removal of the ossicles, of which I have had little or no experience.

I want to confine myself to the every-day treatment of the condition popularly known as a "running ear." From the false perspective of an out-patient clinic, one is tempted to affirm in his haste that every second child among the poorer classes possesses such an ear. Of course, a statement of this kind would be absurd, and yet the temptation to make it indicates the prevalence of this form of ear disease. Nor is there anyone so bold as to maintain the good old view that this flux from the ear is healthful, and can only be stopped at your peril—a view which illustrates well the dangers of faulty observation and induction.

It was sometimes observed that in cases of chronic otorrhœa, when the discharge suddenly became scanty or ceased altogether, symptoms which one writer describes as of a "typhus variety," arose. The disease, according to the old writers, had been driven in—a theory much in vogue with regard to eczema, infantile diarrhœa, and other conditions. We know now the true explanation of this phenomenon, and recognise it as an argument in support of one of the basic principles of otology, that a chronic discharge from the middle ear should be made to cease as soon as possible.

The dangers attending a chronic otorrhœa—you all know what they are: a portentous list of pyæmias, septicæmias, cerebral abscesses, *et omne hoc genus*. That these dangers are there, no one denies, but it is of the utmost moment to determine to what degree they are there. An answer to this

question is required before we can decide when a certain line of treatment should be abandoned, and something more drastic take its place.

I think it is MacEwan, of Glasgow, who says that he would rather have a chargs of dynamite in his ear than a drop of pus, and, arguing from this, advises the mastoid operation in all cases that resist ordinary treatment for a certain length of time. My individual preference would be for the pus, and I would let it run for a long period before I consented to having my mastoid process shelled out, unless some more urgent symptom made its appearance. I am aware that in saying this I am running counter to many of the chief authorities of the present day. Thus, at the discussion following the historic paper of Ballances on the mastoid operation at the Royal Medical and Chirurgical Society, the majority of the speakers advised the radical mastoid operation in cases of long continued and intractable suppuration in the middle ear. But before I allowed an operation on myself—which, after all, is the best test—I should want particular information about:—

1. The dangers of the operation and the anæsthetic.
2. The dangers to my facial nerve, and to what hearing power I had left.
3. The chances of the discharge continuing even after the operation.

When I knew all about these, I should be prepared to weigh them against the risk of continuing to treat my otorrhœa by the usual methods. I have not been very successful in finding statistics with regard to the mortality from suppurative ear disease, but in Schwartze's clinic at Halle there were eighty-nine deaths out of a total of 5074 cases of middle-ear suppuration—a death rate of 1·7 per cent. This seems a high mortality, but I think no accurate deductions can be made from these figures. It is probable that many of the fatal cases had never had any previous treatment, and were admitted into hospital in a dying condition. One would need to know how many of these cases developed mastoid and cerebral symptoms while undergoing regular treatment for chronic otorrhœa. I think myself, that the number would be found to be very small. It is impossible to get any accurate figures on this point from the vital statistics of the Australian States. Thus, out of the 15,000 deaths in New South Wales in 1899, only eleven are ascribed to chronic suppurative otitis, the other cases being, without doubt, hidden away under the heading of meningitis, cerebral abscess, &c. An American writer (Sheppard) gives the frequency of death as a result of ear disease as compared with the total number of deaths, 119 in 38,000—0·3 per cent.—but here, again, the result is vitiated for my purpose by lack of information as to the previous treatment of these cases. With these figures before me, I would, I think, accept the risk—a risk comparable to drawing a prize in Tattersall's—and trust to the surgical skill of my *confrères* to pull me through if the worst came to the worst. By this I simply mean that I deprecate the performance of the mastoid operation merely because a purulent discharge has continued for a considerable time from the ear, and has failed to respond to treatment. And I am prepared to admit that the number of such cases is very large. How often do we really cure a chronic otorrhœa? An acute purulent otitis can almost always be satisfactorily dealt with; a chronic case will exhaust all our remedies and patience.

For, when we set out to cure a case, what are the results we desire to bring about? First of all, we want to stop the discharge, and then to heal the perforation through which this is flowing. If the perforation cannot be closed, the next best result is the lining of the tympanum with epithelium, and a cure should also mean that the discharge will not return, or at least, that there should be no greater chance of its recurrence than of its arising in an ear which has never been affected. Now, my experience is that it is by no means easy to bring these various results about. It is not difficult, as a rule, to lessen the amount of the discharge or remove the fetor. But to

ensure a perfectly dry tympanum is another matter. Do what we will, there often remains a trace of pus on the floor of the meatus, or the inner wall of the tympanum continues moist. And nature, in a perverse mood, has a way of keeping perforations open, even though all discharge has ceased, and one coaxes the edges with all sorts of stimulating applications. And when the loss of membrane is so great that closure is out of the question, the papering of the tympanum with epithelium is, in many cases, a most tedious process. A half, or perhaps two-thirds, of the inner wall gets satisfactorily covered, but a small area remains red and damp, and on to it the epithelium will not pass.

But grant that the discharge has stopped, the perforation closed, or the tympanum become lined, we have not yet reached our Promised Land. Nothing is more disheartening than the way in which a purulent discharge will return on seemingly little or no provocation. The closing of a perforation does certainly eliminate the risk of continued infection through the meatus, but that risk is only a minor one. The chief source of infection, or re-infection, is by way of the naso-pharynx, and this route is very difficult to control. I believe that once the Eustachian tube has been made the channel for the conveyance of septic infection to the middle ear, there is established a predisposition for similar infections to select again the same road, and that in this way danger is always threatening the tympanic cavity. Or may there not remain a condition somewhat of the nature of a gleet, which any congestive or catarrhal process will stir into renewed activity?

The history of so many cases is that there has been an intermittent discharge—a discharge which has sometimes ceased for years, but seems inevitably to return. We must believe that these cases have reached again and again a stage of cure of unstable equilibrium which a very slight cause will upset. And so the vicious cycle goes round.

I am simply arguing that brilliant successes are not the rule in the treatment of chronic otorrhœa. It may be that a wider experience will prove this conclusion to be unduly pessimistic, or that criticism of this paper will acquaint me with methods which will give more satisfaction than those I have employed. And I will confess that the temptation to draw a gloomy picture may have been stimulated by the desire to give emphasis to the ideal of all medicine-preventative treatment.

The otological status of a community—a phrase I have plagiarised from an American writer—is of sufficient importance to demand the closest investigation. And one of the first facts to appear is that the vast majority of cases of chronic otorrhœa begin in childhood.

It may be that—as in scarlet fever or other diseases from which children suffer in a much larger proportion than adults, not because they have any special proclivity to these diseases, but because those who are susceptible usually acquire them in early life—the frequency of chronic purulent otitis in childhood may arise from a similar cause, but I think there are other factors at work. These are the small size of the naso-pharynx in childhood, the prevalence of catarrhal and infectious diseases at that age, and the frequency of lymphoid hypertrophy in the naso-pharynx.

On this last factor I would lay the greatest stress. I believe that the existence of adenoids contributes more to the production of purulent otitis than any or all the other causes put together. While I do not dispute the importance of the *rôle* played by scarlet fever, measles, and other zymotic diseases, I am convinced that in many cases the presence of adenoids is the necessary concomitant for the production of the ear trouble, and in others, that it greatly aggravates the condition, and afterwards prevents the return to the normal. So certain am I of this that I believe it is practically impossible to cure a case of chronic purulent otitis if the naso-pharynx is blocked with a mass of adenoid tissue, and one of the first steps in treatment should

be the removal of the adenoid hypertrophy. To do this is only to act in accordance with one of the canons of surgery—to remove the focus of infection. There can be no doubt but that the popularisation of the adenoid operation will do much to reduce the number of the cases of chronic otorrhœa.

I feel strongly also that we should endeavour to impress upon the general practitioner the necessity for attention to the naso-pharynx and ears during infectious diseases. The need for this should be evident, when Friederich states that at least 12 per cent. of all cases of purulent otitis are secondary to scarlet fever, and Bezold points out that in 50 per cent. of these cases there is either total destruction of the membrane, or a loss of two-thirds of the disc. The former writer also states that the most characteristic features of this suppuration are an obstinate resistance to treatment, and a tendency to carious destruction which frequently involves the ossicles as well as the bony walls of the tympanum and contiguous cavities.

The prompt recognition and efficient treatment of acute middle-ear inflammation would prevent many of these unfortunate consequences. For I am inclined to think that the conversion of an acute otitis into a chronic is due mostly to a secondary infection through the meatus. Many cases of acute otitis with perforation return to the normal without any treatment at all; many others would do so also if a mixed infection could be prevented. I am not at all certain of the value of syringing with antiseptic lotions in acute otitis, and you are aware that some authorities condemn it altogether; but I am convinced that careful disinfection of the external meatus, followed by packing with iodoform gauze, is indicated.

If all cases of acute otitis, whatever be their cause, received vigorous treatment, I believe we would be called upon to deal with very few cases of chronic middle-ear suppuration.

That this efficient treatment is not generally carried out must be presumed from the large number of cases of chronic purulent otitis we meet with. These cases compose a large proportion of those attending outpatient clinics for the ear. And I am inclined to think that when the opportunity offers they wander from one hospital to another, suffering many things from many otologists.

I suppose the routine treatment practised everywhere is to prescribe an antiseptic lotion and some boracic powder, and to give instructions to syringe with the one and to insufflate the other. Some of the cases undoubtedly are quickly cured, but we must not conclude too hastily that the treatment is responsible for this. For one occasionally meets with cases where the middle ear is found perfectly dry and cicatrized, and yet the patients affirm that nothing has ever been done to the ears.

And again, I fear we are somewhat prone to accept the patient's own statement as to the discharge having entirely ceased. I have often examined a trace of pus could be obtained by introducting a probe with cotton-wool. ears from which it was alleged that there was no discharge, and found that If treatment be interrupted in such a case, matters may soon be as bad as ever, and the most horribly offensive discharge is sometimes to be found in cases where the amount of discharge is very slight.

Again, other cases improve up to a certain degree. The discharge lessens, and becomes odourless, but still it does not cease. And yet one cannot discover granulations or carious bone to account for this.

What is the reason? I believe that in a large number of cases it is due to the treatment not being carried out in an efficient manner.

The objects of treatment are:—

1. To cleanse the ear thoroughly.
2. To destroy or reduce the virulence of any pathogenic organisms present.
3. To guard against re-infection, either from the naso-pharynx or from without.

How does the ordinary house treatment fulfil these conditions? The sixpenny glass syringe, which is generally used, is not an instrument of much potency. I think it will be often found that the plunger affords so feeble a *vis a tergo* that the most of the lotion remains in the barrel. It is certainly not able to remove the thick tenacious pus met with in some of the cases. And its asepticity is far from being above suspicion. I fear it is sometimes put to various domestic purposes, and is used ungrudgingly when the baby requires an enema. Nor does the unsufflated powder find its way, as a rule, far beyond the concha.

My contention is this: that many of these cases cannot be properly treated at home—at least, in the homes of the poorer clases—and that we should seriously consider the advisability either of admitting them as in-patients, or of insisting on a daily attendance at the hospital. In this can we not learn something from our ophthalmic *confrères?*

The disease in their practice, which from its frequency and persistence may be likened to chronic middle-ear suppuration, is trachoma. Now, whenever possible, bad cases of trachoma are admitted into a hospital, or at least the treatment is chiefly carried on at the outpatient department. No oculist that I know of leaves the application of the copper stick, or of strong solutions of nitrate of silver, to the mother or elder sister of the patient. If this were done, I imagine that trachoma would be found an even more tedious disorder than it is under existing conditions of treatment.

The ideal would be to take the patient into hospital, and seek by rigorous treatment for a few weeks to bring about a cessation of the discharge.

In order to carry out the first object of treatment—the thorough cleansing of the ear—it may be necessary to use the syringe several times a day. In fact, Professor McKernon, of New York, recommends, in some cases in children, that the ear should at first be irrigated every two hours until a lessening of the discharge is observed.

Occasionally the intra-tympanic syringe will be very useful, and I have found the apparatus devised by Dr. Hankins, of Sydney, by which the fluid is forced in at considerable pressure by an air-pump, to be of great service in some cases. A large amount of *débris*—ispissated pus, and epithelium—can sometimes be removed by this, when the ordinary syringe has failed to effect anything.

I have never been able to make up my mind as to the respective merits of the various antiseptics recommended—and there exists no antiseptic so poor that some authority has not done it homage—and I am sometimes inclined to doubt the wisdom of using antiseptic lotions as a routine practice at all.

The solutions generally used, while not strong enough to destroy micro-organisms *in situ*, are capable of lowering the vitality of the tissues with which they come in contact, and thus make them less resistant to the germ invasion. If the object to be attained be the removal of the discharge which, by its putrefaction, increases the intensity of the irritation, and also affords a nidus for further bacterial growth. I do not see why this should not be effected by sterilized water or by an alkaline lotion, such as we use for the nose or throat. It was by prescribing a solution of bicarbonate of soda for this purpose that gave James Hinton part of his fame as an aurist. The alkaline lotion has the advantage of being bland and unirritating, and of having a certain solvent action on pus, which would enable the tympanic cavity to be cleansed more thoroughly.

As long as masses of hardened pus and epithelium are pent up in the middle ear, all the antiseptics in the world will be useless to improve the condition of things. One of the few luminous sayings in that long and wearisome book of Albert Buck's is where he states that it is not far from the truth that if the beginner in otology has mastered the difficult art of properly cleansing the car, he will find himself a master both in the diagnosis and treatment of diseases of the ear.

For the furtherance of this cleansing process, I am a firm believer in the peroxide of hydrogen as an instillation in the ear, and this not for any antiseptic action it may possess, but from its mechanical property of loosening any inspissated discharge. It is true there has been a certain amount of hostile criticism of the peroxide. It has been said that there is a risk of driving back infectious material through the aditus, and thus causing involvement of the antrum. I cannot but think that this is merely a theoretical danger, and that the objection applies with equal or greater cogency to forcible syringing of the ear.

I would also insist upon the importance of getting the middle ear as dry as possible after syringing. To do this, the ear should be inflated by one or other method, and then all moisture carefully mopped up by cotton-wool swabs. By this means any tenacious pus that has resisted the syringing may be removed, and the tympanic cavity rendered quite clean and dry.

Having got the tympanum thoroughly dried, the next question is: to insufflate or not to insufflate.

To my mind the answer to this depends entirely on the quantity of the discharge. If this be profuse, it is contrary to the principles of good surgery to place any obstacles to its escape, and the indication is for the use of gauze packing.

But, on the other hand, it will be found in cases in which the discharge is very scanty—a mere moistening of the tympanic walls, and where a large perforation exists—the firm packing of the meatus with boracic acid will often be very effective.

This is the essence of the so-called "dry treatment," the earliest form of which was devised by an old quack, who sometimes cured chronic otorrhœa—when he did not kill the subject—by pouring a paste of plaster of Paris into the ear.

The secret of the success of this treatment I do not know. It might be presumed that it acted by cutting off the supply of oxygen from the pathogenic organisms, but unfortunately for this explanation, the staphyloceus, which is the bacterium most often found in middle-ear suppurations, flourishes equally well with or without oxygen.

It is possible that the pressure may act mechanically, either on the micro-organisms, or on the granulation tissue in which they exist. But whatever the reason, it is undoubtedly true that a few packings with boracic acid, after careful cleansing of the tympanum, will sometimes work wonders.

This leads to the question of the treatment of granulations. In the pre-antiseptic days, astringent solutions were the chief means of treating chronic otorrhœa, when it was thought expedient to meddle with it, and sometimes they did good.

At present alcohol is the favourite remedy, and it has undoubtedly a marked effect in some cases. It is claimed for it that it is both astringent and antiseptic, though some authorities deny to it any but the feeblest germicidal action. It is said that a 50 per cent. solution in water has the most decided effect. I have used solutions of nitrate of silver, of strengths from 1 per cent. to 12 per cent., applied by a cotton-wool mop, and I am inclined to think it was of service.

Some American writers advocate pure carbolic acid in cases which resist ordinary treatment. The procedure consists in filling the auditory canal with carbolic acid, which is retained there from thirty to sixty seconds. The ear is then syringed with absolute alcohol.

I have not tried this method myself, but it seems reasonable, and I should like to know if any present have had experience of it.

Lastly, we have the curette, and I think many of the best results we obtain are got by its use.

I have found the solution of cocaine in anilin oil and rectified spirits very valuable in cases where curetting is indicated, cases which otherwise would have required a general anæsthetic.

By the curette also one can deal with areas of superficial bone caries and the stump of polypi. I think such treatment is preferable in the latter case to the application of chronic or trichloracetic acid, or to the use of the galvano-cautery, which is sometimes recommended. I believe a thoroughly curetting, followed, if need be, by alcohol instillations, or merely by systematic syringing, will fulfil all indications in many cases.

I have sometimes wondered if, in those cases where there is a large, healthy-looking granulating surface on the inner wall of the tympanum, we could not expedite matters by seeking to fix skin grafts on this surface. After a preliminary curetting and disinfection of the granulating area, I do not see why the grafts should not sometimes become attached.

I will leave to subsequent speakers the task of dealing with the cases where the attic or even the mastoid, antrum, is involved in the chronic suppurative process. It is, therefore, unnecessary for me to discuss the important question of chronic discharge through a perforation in Schrapnell's membrane, or the indications for the removal of the ossicles.

Discussion.

Dr. Hogg thanked Dr. Arthur for his introducing the subject. There was no doubt that to have successful results in such cases, the surgeon must himself attend to the ear, and not leave the dressing to the patient or his friends. The speaker's routine method was to wash out the ear with some antiseptic lotion (and he most frequently used carbolic lotion), dry the ear, introduce peroxide of hydrogen, dry, and pack with iodoform gauze. Sometimes he insufflated some powder, such as aristol, which is very valuable in such cases, sometimes he did not. The drying was by wool mops, politzerization, and occasionally by suction. Such routine treatment had to be continued, in some cases, for months. Of course, the naso-pharynx should, if necessary, be attended to. There was a class of cases, however, with attic disease, mastoid complications, &c., in which operative measures had to be resorted to, but the title of Dr. Arthur's paper prevented discussion of such methods. In attic disease he had found Stacke's method by inflation of the auricle a good one for getting free access to the seat of mischief, for he viewed attic operations through the meatus with a certain amount of suspicion.

The President, in referring to otorrhæ as the prominent symptom of suppurative otitis media, pointed out as the reason why this discharge is rarely stopped without treatment, is because there is an absence of the glandular element in the otitic mucosa, also that the incus is most often necrosed, because its blood supply depends upon one small artery, which is readily occluded by pressure from any slight swelling. Again, the attic, which is separated from the tympanic cavity, partly by the ligaments of the malleus and incus, and partly by folds of mucous membrane, may become isolated from the main cavity by having the communications with the latter closed by morbid processes, hence the importance of removing septic accumulations in the treatment of attic suppuration. This, according to Polizer, is best done by curetting and syringing with an intra-tympanic cannula, such as that used by Blake (exhibited), and in some chronic cases there is nothing for it but removal of the malleus. Peroxide of hydrogen comes in here as a most excellent cleansing agent, as it so readily finds access to all the small nooks and corners of this irregular cavity. It is a good clinical rule to follow in ear suppuration that any treatment which fails to correct fœtor should be changed as not fulfilling the main indication. The treatment of

middle-ear suppuration may be summed up in two words: Cleanliness and drainage. The former can be most effectually carried out by the following routine practice:—Wash out with sterilized normal alkaline solution, dry with a mop of cotton-wool on an applicator, instil peroxide of hydrogen, dry again, inflate with Polizer's bag, instil peroxide of hydrogen again and dry, and finally insufflate powder if the case be suitable for such, and insert a dry sterilized tampon. There are some cases in which powder insufflation is not a correct thing to do, unless the patient can be closely watched—that is, where the cavity is small, and thus easily stopped up. A tampon of gauze is now considered the correct application to secure drainage, and nosophen gauze is much the best. This drug is preferable to iodoform, as it parts more readily with its iodine—of which it contains a large percentage—and being an impalpable powder, it does not become caked on the suppuration surface. Nosophen has also a good effect on the ecxematous condition of the meatus, which usually co-exists in such cases. For this latter condition lead lotion is also an excellent application, or an etherial solution of nitrate of silver 15 grs. to 1 oz. of sweet spirits of nitre, which is specially useful if the dermatitis is complicated with hyperplasia of the tissues. In those cases in which the perforation is slow in healing, the application of trichloracetic acid, according to O'Kuneff's method, is the best way to hasten its closure. Under this treatment very large perforations may be closed, with a very small scar. The way in which the acid acts is this: it destroys the redundant pavement epithelium which lies heaped up along the edges of an old perforation, and which offers a mechanical obstacle to the extension of more highly-organised tissues behind it.

The nuclein preparations of mercury and silver—mercurol and nargol—promise to be very useful in ear as in other suppurations. As they do not coagulate albumen, they act more promptly and directly in destroying germs and in restoring a healthy condition of the parts.

The speaker has used oxygen in ear suppuration, as recommended by Stoker, of London, but has not had much, if any, success with it, and it has the disadvantage of being troublesome to apply thoroughly, and wearisome to the patient. In the treatment of chronic cases, especially when the mastoid has become involved, the method of treatment suggested by Aitken (*Lancet*, April 20, 1901) promises to be very useful. He pours the fluid into the ear, then, having rolled some wool on a probe, fitted with special teeth (exhibited), makes a "piston rod." With this the fluid can be forced into all the recesses of the middle ear and mastoid, and then, by reversing the process, sucked out again. The speaker has adopted this method, using as the fluid a 10 per cent. solution of amyloform in alcohol, and can speak favourably of the results. Should the method succeed—as the author says it does—in curing these chronic cases with mastoid involvement without operation, it certainly will be a most valuable procedure.

Dr. Hankin said the question of mastoid operation simply as a cure for middle-ear suppuration would depend often upon whether the patient could be kept under constant supervision and treatment. When this was possible an operation might be deferred infinitely, but otherwise a radical operation should be performed before the patient was lost sight of. In his (Dr. Hankin's) experience, an operation, although generally satisfactory in every other respect, did not result in improved hearing; in fact, this was generally rendered less acute, and in some cases what little hearing power the patient enjoyed was lost altogether. And this fact made him hesitate to recommend operation in the absence of danger signal, and where the treatment could be well looked after.

CASES OF SMALL ABSOLUTE SCOTOMA CAUSED BY HÆMORRHAGE IN THE OPTIC NERVE.

BY

Edward L. Gault, M.A., M.B., M.S., Oculist Alfred Hospital, Melbourne.

I desire to bring the following cases of scotoma before the Section of Ophthalmology with the double object of giving an opportunity for recording similar cases which have occurred in the practice of my *confrères*, and of inviting your criticism of the views I put forward as to their causation. I trust, therefore, that, although this paper treats of a disorder which is of rare occurrence, and of relatively small importance, it may, nevertheless, give rise to some discussion.

I have now met with three cases of small, positive scotoma in the visual field, situated near the point of fixation, which causes annoyance from the fact that it is always present to consciousness, being projected upon every plane surface as a dark spot, the size of which varies with the distance of the plane surface from the eye of the observer. A careful search of the fundus in the region corresponding to the position of the scotoma in the visual field failed to reveal any lesion which would account for the complete loss of vision within the blank part of the field. This circumstance lead me to place the lesion somewhere in the course of the conducting fibres of the optic tract, for I could not conceive of such a complete defect of vision as being caused by a disease of the fundus which would leave no trace of its incidence in the form of atrophy, massing of choroidal or retinal pigment, or remnants of hæmorrhage.

Perhaps before I discuss etiology any further I had better report the three cases as their histories occur in my case books.

Case 1.

Miss B., a young lady of about twenty-five years of age, and apparently in good health, was seen by me on March 25, 1896. She told me that one Sunday, a few months before the previous Christmas, she noticed a sudden darkness come over the right eye, and then found that she could see with it only in certain directions, but not in others. She states that now she cannot see with it as well as with the left eye. She complains of a dark spot, always seen with the right eye, and occupying a constant position in the visual field, and that this has persisted without change from the time when she first noticed the clouding of her sight. She never felt any pain in the right eye. She had always been able to see well with both eyes previously. She had suffered from no blow or injury to the eye. She had "blight" many years ago. Two years ago she had typhoid fever, but since then her health had been perfectly good. There was no disease of the eye externally, the media were transparent, and no morbid change could be made out in the nerve, or in the retina or choroid, either in the affected area or elsewhere. By the perimeter a well-marked absolute scotoma was made out, with a 4 mm. white square. Its shape was very irregular, and its margin extended from 5 to 10 mm. from the point of fixation, almost immediately above which it was situated. Two days later an almost identical record was made with a 2-mm. white square. The field of vision extended practically to the periphery. The vision of each eye was $\frac{6}{6}$, but the patient stated that she saw the letters more distinctly with the left eye than with the right.

Case 2.

A.A., æt. thirty-five, was seen by me on August 30, 1899. He had noticed for several years that, if he closed his left eye, a dark spot appeared

in the field of vision of the right, which concealed objects close to and above the point of fixation.

Some five years ago he consulted an oculist, who found that he had myopic astigmatism of—1.5D in the right and 1.75D in the left, and that correction gave LV— $\frac{6}{5}$ partly, but RV—$\frac{6}{9}$ only. The patient had suffered from a well-marked attack of syphilis some years previously, for which he had undergone a thorough course of treatment with mercury, extending over two years. During this time he had suffered from albuminuria, which, however, ceased when the mercury was discontinued. The patient could not fix the date of the occurrence of the lesion. He had never smoked, and had always been extremely temperate in the use of alcohol. The perimeter showed an elongated paracentral absolute scotoma, extending from the point of fixation outward to the blind spot of Mariotte.

Examined with the ophthalmoscope, the media were transparent. Up and in from the disc beneath the ascending nasal branches of the retinal vessels there was a somewhat large irregular area, having a steel-grey coloration, which insensibly shaded into the colour of the surrounding normal fundus. There was, however, no massing of pigment granules. Upon the face of the optic disc, outward and slightly downward from the point of entry of the retinal vessels, there was a small sector-shaped patch of brownish discoloration, the edge of which did not extend quite to the margin of the disc.

CASE 3.

H.L.V. was seen by me on March 2, 1901. He was a single young man of about twenty years of age, and had always enjoyed good health. He said that for the last eighteen months he had noticed a dark spot in the field of vision of the left eye, a little down and out from the point of fixation. He had no recollection of having received any blow or other injury, and had not been liable to the occurrence of hæmorrhage. He could not definitely fix the date of the appearance of the scotoma.

His eyes were found to be normal in every respect. The vision of each separately was $\frac{6}{4}$ partly. The appearance of the fundus was absolutely normal. By the perimeter a somewhat larger absolute scotoma was made out, with a 5-mm. white square. Its shape, as observed on March 2, and again on March 8, was subject to variation, but I take it that the variation was due to error on the part of the examiner or the examinee, and not to any real alteration in the scotoma itself.

Taken together, these three cases are interesting, and tend mutually to strengthen the diagnosis of a lesion in the optic tract, and probably in the optic nerve connected with the affected eye. The scotoma being perceived by one eye only, it follows that the lesion cannot be placed behind the basal ganglia, and probably not behind the chiasma. The discoloration of the fundus observed in Case 2 was not situated in a position corresponding to that of the scotoma in the visual field, and moreover, it looked like a patch of congenital pigmentation rather than pigmentation the result of injury or disease of the fundus.

The brownish discoloration of the disc in Case 2, however, was very like the stain which might be left by hæmatoidin, and strongly suggested the occurrence of a small hæmorrhage among the fibres of the optic nerve, near the disc. In Cases 2 and 3 the history pointed to nothing noteworthy at the time of onset, but in Case 1 there was a definite history of sudden onset and marked clouding of vision, such as might be expected to occur in a case of vascular lesion. Taking the cases together, I am disposed to think that in each a small hæmorrhage has taken place among the fibres of the optic nerve, causing some temporary impairment of its conducting power, and also a permanent lesion of a limited number of fibres originating in the region of the fundus, which corresponded to the scotoma. That individual fibre

bundles are related to special areas of the retina appears evident from anatomical considerations, as well as from the examination of optic nerves in the subjects of toxic amblyopia. As yet no opportunity has been afforded me of converting my surmise into a certainty by an examination of the optic nerve from a case such as I have described.

Discussion.

Dr. Jackson thought these cases were, as suggested by Dr. Gault, probably due to hæmorrhage and injury of optic nerve fibres, but that before coming to any positive conclusion as to this, all possibility of its arising from a local retinal cause should be eliminated by a careful scrutiny of the fundus, as somewhat gross lesions of the retina occur and disappear without leaving any trace behind. A case of this kind, in the person of a medical man of robust type, came under my notice, in which, on using the ophthalmoscope, a dense, sharply-circumscribed hæmorrhage revealed itself in the region of the yellow spot. I had the opportunity some months after of repeating this examination, and, to my surprise, nothing whatever existed to indicate the site of the old hæmorrhage, while the vision was in all respects normal.

Dr. Pockley mentioned, as a curiosity in scotomata, the case of a well-known medical man in Sydney, who had a persistent *green* positive scotoma following influenza. The ophthalmoscope showed, extending from the margin of disc, at a place corresponding to the projection of the scotoma, a small patch, which might have been considered to be opaque nerve fibres, but was of rather a darker, somewhat slaty, colour. He could give no explanation of the green colour, and the patient, who had searched deeply into the literature of scotomata, could find no record of any similar case.

THE OPERATION FOR CATARACT.

BY

Wm. M. Stenhouse, M.D. (Glasgow), Late Hon. Physician Dunedin Hospital.

About ten years ago circumstances induced me to revise my procedure in cases of cataract, so as to obviate some of the more common complications that hazard the success of the operation, and cause much anxiety and delay. The most careful observer may be deceived as to the thorough ripeness of the lens. Even when adjudged mature by all the usual tests, the cortex may retain more or less viscidity, and may still adhere with some firmness to the interior of the capsule. In such a case failure or complications will arise, in a certain number of cases, from the difficulty of removing the fragments of the cortex, or from inflammation of the iris, through small pieces getting enmeshed in the cut surface of the iris. Now, it occurred to me that the safest plan would be to make a preliminary iridectomy, such as is done in cases of immature cortex, and proceed with the extraction some weeks afterwards. This method I have carried out ever since, with the happiest results. It has the further and great advantage that it enables the surgeon to do something as soon as he first sees the case, and does not doom the patient to the long and weary waiting which takes place while the cataract is undergoing maturation, and which has so often an injurious effect on the patient's health and spirits. It has the further advantage of keeping the patient in one's own hand; for it often happens that the surgeon is consulted for cataract, and never sees his patient again, after he has explained the necessity of operation at some future indefinite period. Whereas, if the iridectomy is performed at once, the patient is pleased to find the operation easy and painless, which gives him hope for the future, and confidence in his surgeon. While the immediate effects are to increase his field of vision for a time, and to lessen the time of maturing—for it is a well-known fact that a preliminary iridectomy has the effects of hastening the ripening of the cortex—so that in about two months it will be found ready in every respect for extraction.

It is quite true that this method lacks the brilliancy of the extraction at one operation, when, if entirely successful, the patient is at once restored to useful vision. But, after all, should not the safety of the patient be the surgeon's first consideration? I find that in most cases, if the reasons are explained for the double operation, the patient is only too glad of falling in with the safer alternative. Even the most expert operator will lose a certain percentage of cases after the single operation, that would do well by the double method, while to the beginner, or the surgeon who gets only a few cases, and these only after long intervals, it offers advantages, both to himself and the patient, that should far outweigh every other consideration. Especially should it be adopted by every operator when he is about to deal with the most anxious of all cases, where the patient has only one eye—a failure then meaning irretrievable blindness.

I have much pleasure, therefore, in offering this suggestion to the profession, and warmly recommending it to gentlemen who are beginning their career as oculists.

Discussion.

Dr. Jackson favoured the preliminary iridectomy in cases of cataract where this was feasible, but in a large majority of the cases operated upon did the iridectomy at the time of extraction, because of the inability of patients to

wait the necessary time. Individual cases occur where a preliminary iridectomy should be insisted upon. Though favouring a moderate-sized coloboma for cosmetic reasons, there is no doubt that good optical results often occur when the coloboma is large, but as the object of an iridectomy is chiefly to overcome the obstacle presented by the spherometer to the exit of the lens, a small-sized coloboma is, on the whole, desirable.

The President confessed to having a weakness for preliminary iridectomy, particularly as it affords the operator the best opportunity of making the coloboma the exact size and shape he wishes to make it. He endeavours to follow the practice adopted by Swanzy, who has never taken to the "simple" operation; but, whilst doing the next best thing, aims at making the coloboma as small as possible—a 4-mm. opening or thereabouts—in order to get the neatest cosmetic result, and to prevent the diffusion of rays, which a wider coloboma allows. The speaker has, however, found one objection to the preliminary operation—an objection which, after all, does not weigh very much—and it is this: that if adhesions form, as they sometimes do, between the pillars of the coloboma and the posterior part of the cornea, there may be a little more difficulty in delivering the lens in the second operation. This can, he believes, be prevented by seeing that the iris is left as free as possible at the limbus in doing the iridectomy. By making this small coloboma you get, for all practical purposes, as nice an eye as in the simple operation, with the compensating advantages that the extraction is easier to perform, the soft lens material more readily removed, and all danger of iris prolapse is effectually prevented.

NASAL STENOSIS DUE TO DEFLECTIONS OF THE SEPTUM.

BY

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Up to the year 1885, or thereabouts, the true physiology of the nose seems to have been but imperfectly understood. Olfaction was up till then considered by physiologists to be the prominent function of the nasal mucous membrane. In this year Bosworth, of New York, read a paper before one of the American societies, in which he announced that respiration, not olfaction, was the prominent function of the nostrils, and in the following year his views were confirmed by the experiments of Aschenbrandt of Leipsic, and later on by those of Kayser.

These discoveries seem to have marked the commencement of a new era in the treatment of nasal stenosis and kindred pathological conditions, the advent of which era was heralded by the introduction of a new operation by Bosworth for the correction of deformities of the nasal septum. Previous to this the subject of nasal stenosis from septal deformities had received but little attention; teachers in the cliniques and textbooks of this or earlier dates had little to say on the subject. It is true there had been various operative procedures recommended from time to time prior to this period, but those of us who have tried some of them will, I think, agree with me in saying that they were at best disappointing and ineffective. And the reason for this is not far to seek; it is this: all operations devised up to those of recent date failed to accomplish what their originators aimed at, *i.e.*, patency of the nostril without mutilation of the septum, because the principle underlying these procedures was faulty, inasmuch as in them no adequate provision was made for dealing with the resiliency and redundancy of the septum. A brief enumeration of some of the methods in question will suffice to show why they have thus failed. In 1875 Adams (1) introduced a flat-bladed forceps for crushing and refracturing the septum, subsequently holding the parts in place by splints. (2) This was a painful, and generally unsuccessful method of dealing with the condition. Jurasz (Berlin) somewhat modified this procedure in 1882. (3) Blandin advocated the use of an "ablative punch" for removing the whole of the offending tissue; (4) and in 1881 Steele modified this instrument in such a way as to make stellate incisions through the septum. Ingalls (Chicago) cut away some of the projecting septum, and refitted flaps of mucous membrane on the raw surface afterwards; Jarvis (New York) used the transfixion needle and snare; Roberts (Philadelphia) the pin for the accomplishment of the same end; and in 1886 Poel (New York) improved on Roberts' operation. (5) I have done some of these operations, but I cannot look back upon my results with very much satisfaction. The new era, above referred to, may be said to have really commenced in 1890, when Morris Asch, of New York, introduced his operation, which has admittedly revolutionised the modern surgery of nasal stenosis depending on deflected septum.

In considering the etiology of deflections of the septum, the general causes may be divided into—(1) congenital; (2) traumatism; and (3) deviation from diseased conditions.

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(1) New York Med. Record, Jan., 1887.
(2) Brit. Med. Jour., Oct. 2, 1875.
(3) Berl. Med. Wochensch., No. 4.
(4) Compendium of Chir. Practique, Vol. III., p. 33.
(5) New York Med. Record, May 15.

1. *Congenital.*—Zuckerkandl has stated that true septal deviations do not commence to develop until the age of seven years; that is, at the time of the evolution of dentition. Yet, in children below that age septal deformities are to be found, some of which have undoubtedly been in existence prior to birth, and others probably have been caused by traumatism during birth or in early infancy. Jacob has presented preparations showing such deformities in the fœtus.(6) Adenoids in the post-nasal space, which have also been proved to exist in the fœtus, having a tendency to cause nasal deformity, may probably exercise their baneful influence in this direction during fœtal life, or at any rate during the earliest years of childhood—the period when adenoid tissue grows most quickly.

2. *Traumatism.*—In estimating the relative frequency of injury as a cause of septal deformity, we are met at the outset with this difficulty. Most patients who have grown up with a deflection are not able to give an accurate account of how and when the trouble commenced. In some of these cases there may have been a trivial accident in early life which started the deviation; but in the greater number there may not have been any injury at all. Looking back upon the cases I have had to deal with for the past fourteen years, I cannot be certain that in more than a small percentage could the deviation be traced to a purely traumatic origin, and, if the cases of split cartilaginous septum, with bulging into both nostrils, *i.e.*, cases of hæmatoma or abscess of the septum, are excluded, these traumatic cases would be fewer still. Asch says trauma does not operate as an exciting cause in more than 2 per cent.; and Ingalls (Chicago) thinks trauma, as a cause, is greatly over-estimated. He cites as proof of this statement the experience he has had in treating Indian children, who, though they are as rough in their play as white children, and must be frequently hit on the nose, yet do not suffer from nasal catarrh.

3. *Deviation from Diseased Conditions.*—Speaking generally under this heading, nutritive changes enter most frequently into the causation of deflections of the septum. Pathological changes in the cartilage vary with the degree of irritation producing the primary increase of nutrition, and the histological structure of the septal cartilage will explain how readily this condition of hypernutrition is brought about. A localised perichondritis having been started, the blood, which is supplied by loops of vessels dipping into the substance of the cartilage from the perichondrium, and the nutrition of the cells being carried on by osmosis from one to the other without the intervention of a capillary network of vessels, we can readily see that a localised increase of blood-supply to these loops must necessarily give rise to more rapid cell-division and proliferation of the intervening cartilage cells than is demanded to supply the waste by cell-death, and increase of cartilage tissue must result therefrom. The cartilage may increase in size so much that the respiratory channel is considerably diminished, and at the same time there is a perpendicular increase causing the septum to become deviated. When the ecchondrosis is on the lower part of the septum, forming, as it were, the crest of the deviation, a vacuum is formed behind the obstruction, caused by a valve-like action of the ala nasi. Inspiration is obstructed because the pressure of air upon the external surface of the ala due to the suction causes it to move slightly inward, and the inferior turbinated coming in contact with the ecchondrosis more closely obstructs the orifice of the nostril like a valve, which, as in the tube of an air-pump, permits the exit of the air, but prevents the influx through the same channel. These ecchondroses are apt to become ossified or calcified in the centre, and may become attached to the outer wall, forming synostoses.

The action of deflected air-currents is said to be a fairly frequent cause of inflammatory conditions of the septal cartilage. Somers says in at least

(6) Internat. Centralbl. f. Laryng, Berlin.

20 per cent. of cases the column of air is deflected from hypertrophied turbinals against the septum instead of passing backwards into the naso-pharynx.

Lastly, mouth-breathing from any cause, but especially from post-nasal adenoids, will, by producing an arrest of nasal development, &c., bring about septal deviations. Possibly, here again hypernutrition comes in as a factor, inasmuch as the blocking up of the naso-pharynx with soft sponge-like tissue, subject probably to hygrometic changes, must necessarily mean vascular engorgement and lymphatic stasis in the nasal cavities.

Of the symptoms caused by deflected septum, not much need be said; they may be grouped under those caused by mouth-breathing, *e.g.*, headache, dryness of throat, eustachian obstruction, general malaise, &c., and the so-called nasal reflexes. Of these latter, asthma is probably one of the most frequent. Epileptic seizures have also been traced to this cause; and in one case which has lately come under my own observation, mental derangement has been practically cured by the removal of an obstruction to nasal respiration caused by a deviated and thickened septum. A similar case has been recorded in the *Journal of Laryngology*, Vol. IX., p. 391, in which, as in my own case, the mental condition seemed to depend upon the nasal obstruction.

Coming now to the actual conditions of the septum which cause nasal obstruction, let me first refer to fairly frequent, but often overlooked, conditions which are to be found at the entrance to the nostril. There is a band—described originally by Roughton, and now known by his name—which is to be found at the junction of the skin lining the vestibule with the mucous membrane covering the anterior nares. It runs from above, backwards and downwards along the outer wall of the cavity. Its presence may be overlooked because the speculum hides the band from view, and prevents it from falling in during inspiration, and producing its obstructive effect. Hollow vulcanite tubes worn at night, or Moritz-Schmidt's nasal dilators relieve the trouble.

Next, there is an obstruction of the vestibule which is due to an abnormal condition of the internal wall, viz., a displacement outwards from the middle line of the mesial crus of the lower lateral cartilage or cartilage of the aperture. There is along with this often a corresponding displacement of the lower border of the anterior extremity of the triangular cartilage of the septum, accompanied by a sigmoid distortion of the columella. This defect frequently reduces the nostril entrance to a mere slit, which practically closes altogether on drawing a breath. The best operation for its relief is that described by Greville Macdonald. (7) The method is as follows:—A single linear incision is made over the most prominent point of the vertical ridge well down to the cartilage with the author's special knife, the muco-perichondrium being thoroughly divided. This latter tissue is then turned up and down with the same author's raspatory sufficiently to expose the portion of superabundant cartilage to be removed, which in turn is cut off with one of Macdonald's gouges specially devised for the purpose, and enough is thus removed as in each case is deemed necessary to relieve the obstruction. The flaps are then allowed to fall back into their places, and finally, the wound is sealed with collodion. The special advantage claimed for this procedure by its originator is, that as the mucous covering of the ridge is preserved intact, the formation of scar-tissue, which means a dry cicatricial surface, is avoided. Experience in doing the operation has led me to think that we are apt in cutting away the cartilage to err on the side of removing too little, and a second operation later on may thus be rendered necessary.

(7) Diseases of the Nose, p. 203.

Of the varieties of septal deflections which have a purely traumatic origin, and which demand specially adapted treatment, is that known as the split cartilaginous septum, with bulging into one, but usually into both nostrils. As mentioned above, this condition is always the result of hæmatoma or abscess. Sometimes, as the deformity is equally distributed between the two nostrils, it may not be necessary to remove any portion of the enlarged cartilage. Where operation is necessary the ecchondrosis can be cut off, and flaps of the mucous membrane are at the same time preserved to cover the area from whence the cartilage is removed. There is one point of special interest in connection with this condition, and that is the progressive sinking of the bridge of the nose, which invariably—at any rate, in young people—follows bilateral hæmatoma, or abscess of the septum. Spencer exhibited a case before the Laryngological Society of London on Nov. 2, 1900, in which the hæmatoma had disappeared without deformity within a month after the injury; but now, two years later, there is marked sinking of the bridge. This sinking is now recognised to be due to interstitial changes in the cartilage and other septal structures, which, by setting agoing a process of contraction, causes the drawing down of the bridge. Two such cases, with similiar experiences, I have recorded in the *Australasian Medical Gazette*, Vol. XX., p. 189, and so convinced am I from my observation of these cases that cicatricial contraction sufficient to draw down the bridge—similar to what we see in the saddle-shaped nose of inherited syphilis—is so likely in young subjects to occur, that I think it becomes a duty to warn the parents at the time of the accident of what may, and will most probably occur later on in the shape of deformity. I mention this particularly because, in one of the cases referred to, the parents blamed the surgeon who had treated the septal abscess for the subsequent depression of the bridge, and my previous experience of such cases enabled me to protect this gentleman's reputation from the charge of mal-practice. In these cases of sunken bridge, as in others connected with marked septal deviation, we are now-a-days called upon to remove the deformity caused by the depression, and here the subcutaneous injection of paraffin-vaseline, as recommended by Gersuny, ([8]) comes in most suitably. Up to the present I have had the most satisfactory cosmetic results from these injections in quite a number of sunken bridges.

We now come to consider the newer operations for the ordinary deflections of the septum. I have already mentioned Bosworth as the pioneer of the modern methods of operating. His sawing operation must, however, despite the author's statements to the contrary, often cause, either at the time of the operation, or, as Dundas Grant points out, at some subsequent period, perforation; consequently, this procedure is suitable only for those cases in which considerable thickening is superadded to the deflection, and in pure deflections, therefore, it has been superseded by operations in which the principles of conservative surgery are more fully recognised. There are still, however, some few cases in which perforation of the septum must be performed as unavoidable, and these are in cases of luxation of the cartilage in childhood, when the luxation is complicated with antero-posterior fracture, and consequent spur-like ridge on the crest of the deviation. Here, removal of the ridge must be undertaken with great hesitation, necessitating, as it does, the weakening of the support on which the contour of the organ depends at a time when evolution is taking place, and when this support is most needed. In connection with this it has been laid down as a rule that no operation ought to be done on the septum until the skeleton of the nose has reached its full development. Rather than interfere, then, with the ridge, which constitutes part of the framework of the nose, it is preferable, if something must be done, to obtain permeability of the nostril by perforating the deflected septum.

([8]) Wien. Klin. Wochenschrift, June 20, 1900.

Having been called upon to deal with a case of true deflected septum, our first duty is to determine if sufficient stenosis of the nostril exists to demand operative interference. This question a little experience in dealing with such cases will generally enable us to decide. The ingenious method recently suggested by Parker for determining the direction of air-currents during respiration, by introducing a fine powder into the nostrils, may materially help in estimating the amount of stenosis caused by a given obstruction in the nostril. There are a few cases in which catarrhal conditions caused by obstruction of a moderately-developed septum close up the chink between the septum and the turbinated. In these, the prolonged use of dilating splints may be enough to restore perfect drainage without any operation to straighten the septum. Lake's moulded rubber splints suit admirably for this purpose, as they exercise equable pressure, and are aseptic.

Having decided to operate on a given case, we proceed to find out the exact shape and thickness of the deflection, and whether the deflection is confined to the cartilage alone, or whether the ethmoid or vomer participates in it further back. To estimate the shape and thickness of the deviation, the use of an incandescent lamp, as originally suggested by Martindale, of Minneapolis, is very useful. This lamp has a brilliancy of two candle-power, and can be introduced into the nostril, giving a very clear view of all the structures in both cavities. I have been using Semon's laryngeal lamp, with the mirror removed, for this purpose, and it answers very well.

If a spur-like thickening of the crest of the deflection exist, this may or may not be adherent to the opposite wall. If there be much thickening, Moure (Bordeaux) recommends its removal as a preliminary stage of the operation, and to wait for a month or so before straightening the septum, so as to allow the wound to heal. If synechiæ exist between the crest and outer wall, they must first be cut or sawn through, then as much of the thickening removed as seems necessary. (9)

For the straightening operation we can choose between the methods recommended by Asch or Moure's modification, Roe, Watson, Gleason, and Douglas. These procedures, whilst differing from each other in detail, all make provision, more or less complete, for dealing with the resiliency and redundancy of the cartilage, and for retaining it in the correct position after operation. Individual operators will prefer one of these procedures, according to the requirement of individual cases. Asch's seems to be most in favour in America, and he it is who can claim to have been the first to elaborate a practical technique for these septal deformities. Personally I prefer Watson's operation, and after having done quite a number of such, I find myself getting fonder than ever of this method. Its attractions to me are, that while it is simple and easy to perform—can be done under cocaine, and requires less after-treatment—it is as effectual in straightening the septum, and as permanent in its results, as any of the other procedures. I do not propose to enter into detail in describing these operations, as doubtless those whom I address are familiar with all of them. I shall only refer to such features of the operation as are necessary to make my remarks intelligible. The distinctive feature of Watson's operation is the lifting of the septum when divided over to the opposite side, and hitching it on there to the lower part of the divided septum. This is a most ingenious, and withal a most effectual, method of dealing, as it were in the one step, with the resiliency and redundancy of the cartilage, and of securing it in such a position as to most effectually prevent a recurrence of the deformity. If the deflection extends back to the bony septum, Watson breaks up the bone with Adams' septal forceps, and moulds it into line. Asch deprecates this forcible breaking of bony deviations of either the vomer or ethmoid, as

(9) Proceedings of the Internat. Med. Congress, Paris, 1900.

dangerous hæmorrhage, as well as fatal septic or meningeal complications, may follow; but Watson maintains if ordinary care be exercised in fracturing the bone, there is no danger; and I agree with him. Again, Watson removes the projecting lower fragment of the septum—which represents the redundant or thickened portion when such exists—after he has fixed the free portion of the septum in position; or in some cases he defers this part of the operation until the other is healed. In some cases, at any rate, it seems to me that the removal of this thickened portion is better done, as Moure recommends, as a preliminary operation; you can then reduce the deflection to exactly the thickness you wish, and leave it the shape best suited for making it fit into position when the second stage of the operation is completed. If a vertical deviation of the cartilage co-exists with the general deflection of the septum, Watson deals with this complication by removing the redundant tissue, and fixing what is left to the vomer by a modification of Poel's pin-operation above referred to, and covers the portions of the pin which press against the septum with indiarubber tubing, to prevent the pin causing a possible perforation along its track. Watson, in making his incisions, usually endeavours to keep the mucous membrane of the opposite side of the septum intact; this is not always easy to do. Escat has suggested a simple method for preventing perforation. (10) He injects a few minims of sterilised hot water with a hypodermic syringe under the mucous membrane of the concave side, thus raising it up from the cartilage. This little device I have found helpful. Schleich's infiltration-anæsthetic fluid may take the place of the hot water, as recommended by Baumgarten, (11) and thus make the one injection answer the two purposes, or cocaine, either applied to the surface or injected under the mucous membrane, will make the operation nearly painless, and the application of adrenalin-chloride, 1-1000, will, unless you happen to cut a large vessel, make it almost bloodless. The use of adrenalin before the cocaine helps also to increase the anæsthetic action of the latter, and at the same time lessens the danger of cocaine-poisoning. If you anticipate hæmorrhage during the operation, it has been suggested by Gleason that the addition of 4 per cent. of antipyrin should be made to the cocaine solution, as you can thereby prolong the anæsthetic effect of the cocaine, and diminish the tendency to reaction and secondary hæmorrhage afterwards. (12)

The next and final step of the operation, and one of no less importance than the others, is the retention of the septum in position during the healing process, which requires three or four weeks to complete. Various tubes and splints have been devised for this purpose. Asch has different-sized tubular and perforated splints made of hard rubber. These are, in my experience, not always satisfactory; being rigid, you cannot adapt them to individual cases, and the perforations which are intended to keep them from slipping out are objectionable, as they encourage granulation formation. Kyle has devised tubes made of malleable metal, which are convenient, as you can adapt them to different-sized nostrils, and they can be sterilised by boiling. I show a silver tube which my friend, Mr. Iredell (Melbourne), devised several years ago, on the same principle as these of Kyle's, and which I then considered, as it was, a novel and very useful invention. For insertion into the nostril immediately after the operation I know of no better or more useful splint than one made out of Bernay's aseptic sponge. It can be so easily adapted to each case, both in shape and size, and is most effectual in preventing hæmorrhage. My routine practice after the operation is: having swabbed out the nostrils with a solution of peroxide of hydrogen and insufflated xeroform or nosophen, I introduce a piece of Bernay's sponge

(10) Gaz. Hebd de Med. et de Chir., May, 1898.
(11) Arch. f. Laryng, Band IX., 1899.
(12) Intern. Med. Mag., Nov., 1900.

into one or both nostrils, making each splint just as thick as I think is necessary to cause gentle and not excessive intranasal pressure. These splints can be retained for forty-eight hours; but one of them, *i.e.*, the one in the originally wide nostril, I generally remove in twenty-four hours. The ease with which they can be inserted and removed is remarkable, and contributes much to the comfort of the patient in the after-treatment. I consider these sponges are one of the most useful of recent additions to the armamentarium of the rhinologist, as they can be adapted to such a variety of uses in nasal surgery and diseases of the nose. After the first few days, when all risk of hæmorrhage is over, I substitute for the Bernay's, Lake's moulded rubber splints; they can be made in any size or shape you like. They are made of four different thicknesses, the thinnest being ⅛ inch thick. Splints moulded out of dentists' wax have been recommended. I have used them, and cannot say I have found them as good as Lake's. Whatever splints we use, we must be careful to see that they are fulfilling the indications for which they are used, and their use must not be discontinued too soon, certainly not until the healing process is complete and all tendency to the formation of granular tissue has ceased. After the use of the splints has been discontinued, it is usually advisable to get the patient to apply an ointment to the interior of the nostril or nostrils for some time, and for this purpose 10 per cent. of ichthyol in equal parts of lanolin and vaseline makes a very suitable application, as it stimulates healthy reaction in cicatricial tissues, and at the same time destroys pyogenic germs. In some cases where there is much thickening at the margin of the wounds on the septum with unevenness of the surface, massage will help to restore the new membrane to the normal condition. Pynchon (Chicago) has recommended this as an adjunct to the other methods of treatment. ([13]) He massages the surface with a cotton-wool applicator, medicated with camphor-menthol or nosophen in glycerine. The ichthyol preparation just referred to makes an excellent medicament for this purpose.

In conclusion, let me very briefly refer to an operation which has been suggested as either a preliminary to or substitute for operations to straighten the septum. I refer to turbinectomy—removal of the inferior turbinated. I only mention this operation to deprecate its adoption in nasal stenosis under any circumstances whatever, but most of all in cases where straightening the septum can accomplish the same end. Surely it should not be necessary with our present knowledge of the physiological functions of the nose, and of the methods of dealing with pathological conditions of the same. I say it should not be necessary for us now-a-days to have to defend a surgical procedure which is strictly scientific and at the same time conservative, against one which is just the opposite; and yet we find quite a recent authority recommending the removal of the inferior turbinated as a first step towards dealing with any deflection of the septum which may exist, and he defends his position by stating that this destruction of the turbinated is a necessary preliminary to further thorough and systematic examination of the septal region and removal of obstructions, according to the exigencies of each case. Complete turbinectomy I have always looked upon as a most unscientific and quite an unnecessary procedure, and the reaction against it has become so pronounced that the operation has been consigned to the well-earned rest which Scheppgrell says it deserves. That the operation is injurious has been proved by Greville Macdonald, who, in publishing his investigations on the importance of the turbinated bodies in the respiratory tract, draws attention to the embarrassment of this process after turbinectomy; and that it is unnecessary is proved by the recent observations of Parker, who found that, in order to relieve nasal stenosis, it is sufficient to remove either the anterior end of the inferior turbinated, or the posterior

([13]) Laryngoscope, Vol. IX., p. 177.

end, or both, but that it is never necessary to remove the whole body. In my opinion, instruments such as Carmalt-Jones' spoke-shave *et hoc genus* should no longer occupy a place in our catalogues, as they are implements more in keeping with the genius of the surgeon-barber period than of this present age of enlightened and scientific surgical handicraft, and operations such as complete turbinectomy—which Brown-Kelly says has not redounded to the credit of British rhinology—should be relegated to the limbo of the forgotten past. Let us hope, then, that the very excellent example set us by our American *confrères* in advocating the operations on the septum above referred to for the relief of nasal stenosis will lead to the total abandonment of such procedures as complete turbinectomy, which is as destructive and unscientific as the others are scientific and conservative.

Discussion.

Mr. Hankins said that Dr. Hamilton's paper was so full of interesting points that the difficulty with him was which of them to select for comment; he would, therefore, begin with the last. He had had one case in which he had tried the injection of paraffin for a sunken nose, and in this case the injection caused a good deal of pain, and some inflammation, lasting for some days after the operation; in fact, there was some threatening of abscess. However, this all settled down, and the result was a decided improvement in the appearance of the nose. As to the proportion of paraffin and vaseline, he had used equal parts, and the temperature of the melted mixture he tested by the finger. The syringe used was a metal hypodermic, with solid metal plunger. The needle was of the size used for aspiration, larger than a hypodermic needle, which was apt to become choked.

Next, as to nasal splints. A piece of perforated zinc wound round with gauze, impregnated with the mixture of paraffin and wax, and vaseline, mentioned above, was very convenient. It could be removed without exciting hæmorrhage, and was comfortable to wear. If a tubular splint were desired, the perforated zinc might be doubled on itself, and covered with the soft unvulcanised pink rubber of which dentists form denture plates, the cut edges of which adhere perfectly on pressure. The same rubber could be used for solid splints, and any thickness obtained by pressing together two or more thicknesses of the material.

As to the operation for deflected septum, Mr. Hankins preferred the saw in the majority of cases. Frequently sufficient room could be obtained by sawing off the projection, without making any perforation. Sometimes a small perforation was formed, and this, he thought, might be disregarded. When the saw cut through into the other nostril early in the operation, he would continue the section until a good flap were formed, but would not detach it. This flap he then pushed through in the manner Dr. Hamilton described. He was not in the habit of keeping in splints for more than a week.

ADENOIDS IN ADULTS.

BY

W. Kent Hughes, M.B. (Lond.), M.R.C.S. (Eng.), Melbourne.

Although it has been often said that nothing new has been left to be observed about adenoids since Meyer's original paper, I think that probably we have forgotten some of his observations. To-day when one speaks of "post-nasals" or adenoids, it is taken for granted that we are referring to a child's complaint. Some day, perhaps, when all children with adenoids have them removed completely, such a statement may be true; but it is nowhere near the truth just now. It is popularly supposed, both in the profession and out of it, that children grow out of adenoids in the same way that they grow out of their clothes. It is just as true, and possibly much less true, than to say that they will grow out of a squint. It is a fact that a squint may disappear, but the hypermetropia remains. So, also, the symptoms of adenoids may disappear but the adenoids remain.

What has given rise to the prevalent idea that adenoids disappear? There are two main reasons: one is, that they are reduced in bulk; and the other, that few people ever look for them, or expect them, to be present in adults.

During 1900, several papers appeared in the *Lancet* and *British Medical Journal*, in which the writers put forward the claim of adenoids in adults to be seriously considered, though I find that, on a patient over forty being exhibited at the Laryngological Society of London, many expressed doubt as to the question of simple adenoid growths, as they were so luxuriant.

In children we meet with two chief types of overgrowth, with variations as to size and texture—(*a*) sessile; (*b*) others tending to possess more or less of a pedicle.

In adults we meet a greater variety—most commonly we have what we might term "remnants"—either a local thickening or a slight roughness consisting of small warty elevations. The local thickening is occasionally central, though it generally is found more or less to one side. The little elevations are scattered here and there, favouring one side more than the other. The next commonest variety is a ridge, or bank, of adenoid tissue stretching from tube to tube, and extending towards the vomer; occasionally it passes downwards beyond the level of the tubes. The surface is quite smooth, and not hard to mistake for a clean pharyngeal wall. The third variety is the condition (*b*) met with in childhood, and as it gets more uncommon as our patients get older, we may presume that it ultimately reaches one of the two former conditions. I have, however, met this luxuriant variety in a man of sixty-five and another of fifty-five.

When I first began to examine the nasopharynges of adults with a mirror, I often overlooked the presence of adenoids; and it was not until I began to examine with my finger, that I appreciated the frequency and importance of "adult adenoids," and I might state here that if the ordinary textbook method is adopted, *i.e.*, passing the finger well up to the septum, and drawing it downwards, many cases will be overlooked. Not only is the non-sentient nail used thus as a guide, but also we are not able to so readily perceive a gentle decline as a slight elevation. If the finger be entered at the level of the free edge of the palate, and proceed gradually upwards along the posterior wall, even the meanest departure from the normal can be detected.

I am firmly convinced that posterior rhinoscopy alone will often fail to impress the observer with the necessity for operating. Several times I have failed entirely to observe adenoid-thickening that I have easily felt. Prof. Meyer, in his original paper, even went further—"Digital examination may always precede, and nearly always supersede, the use of the rhinoscope." One word of warning may I utter—the extreme vascularity of adenoid tissue renders it liable to great change of bulk, and the surgeon may be as equally astonished at finding a small amount of tissue, when operating, in place of a good-sized mass as at the reverse set of conditions.

What is the normal? That is a difficult question. A normal nose is perhaps to be found only in an occasional infant. A normal pharynx may only exist in those people who are not patients.

We are wonderfully and abnormally made; we are full of departures from the normal—and although I do not want you to think that I consider every case of catarrh is due to a slight increase in the amount of tissue in the post-pharyngeal wall simply and solely, still I do wish to lay stress upon the importance of its presence.

Two cases, briefly recited, will bear out the statement that it is of value to operate upon "remnants." They had both been under my care for some time, and I had persevered with the ordinary means of treatment at the disposal of the aurist.

Mrs. T.W., æt. twenty-eight. In September, 1894, came with tinnitus and hearing—right, ½ inch; left, 4½ inches. At the end of a month's treatment she improved as regards her hearing to right ear, 3 inches; left ear, 5½ inches. The tinnitus was not much altered. I had several consultations about her general health, and I treated her nose and pharynx with all the enthusiasm of a hopeful young consultant, and though I got her "tubes" patent, and politzerised her persistently, the improvement remained as above. After five months the patient gave up attending. She came back in August, 1900 (just six years after her first visit), on account of a lachrymal stricture. Her hearing had gone down to right, contact; left ½ inch. I removed the small central thickening that I discovered in the vault of the nasopharynx, and her hearing in a fortnight was right, 10 inches; left, 12 inches; in 2 months, right, 14 inches; left, 30 inches; and to-day, eighteen months after, right 8 inches, left 30 inches. She also volunteered the statement that the tinnitus had quite disappeared from the left ear within a week after the operation, and was much less in the right. She had been quite free from frontal headaches since the operation. The congestion of tubes was much reduced, and the middle turbinates were smaller.

An even more satisfactory case is that of B.M., æt. forty-eight. On February 20, 1897, he came with hearing, right, 12 inches; left, ½ inch. By persistent and laborious treatment he reached, at the end of October, right, 40 inches; left, 16 inches. The improvement was gradual. Right—February, 12 inches; March, 16 inches; June, 24 inches; October, 40 inches. Left—February, ½ inch; March and June, 16 inches; October, 16 inches. I lost sight of him till 19th October, 1900. His "watch" hearing then was, right ear, 8 inches; left, ear, contact. I removed the central thickening in the mid-line on October 23. On the next day, right ear, 20 inches; left ear, 1½ inch; and four days later right ear, 20 inches; left ear, 4 inches; and after a month's treatment, right ear, 48 inches before, 60 inches after politzerisation; left, 12 to 20 inches.

Here was a case so typical of C.C.M.E. He improved under treatment; he vanished, and came back the next year in a state worse than when he first began, and if I had again treated him *en regle,* I would probably have obtained an improvement somewhat below what was obtained the year before.

I am every day becoming more and more convinced of the value of removing this apparently insignificant remnant. Patients with C.C.M.E., like those with optic atrophy, travel from one specialist to another before finally plunging into the arms of the Chinese herbalist or "Jones' Bronchitis Cure," and we all become aware of the other fellow's failures. I have been many times successful, after every other method of treatment has failed before removal of the so often despised remnant. I have noted this in the practice of my brother specialists, but more especially in my own. I am rapidly coming to the conclusion that nearly every case of catarrh of the middle ear is due to adenoids in the first instance, and I also conjecture that there are but few cases in which great benefit will not be derived by removing what remains there are of the adenoids.

The second variety is in danger of being quite overlooked by the mirror; sometimes the slope is so gentle as to be imperceptible, and it is also necessary to take care in examining with the finger.

An interesting case illustrating this is as follows:—H.A.H., æt. twenty. Six years ago first noticed any deafness, and four months ago first really troubled with it. Occasionally very deaf; said not to have "post-nasals." Fifteen months ago I removed the thickened bank of adenoid tissue. Right ear then 10 inches; left ear, 8 inches. The posterior part of the inferior turbinates almost completely filled the posterior nares, so that I was tempted to remove them, but as he had lost a large quantity of blood, I left them alone for another day. In the evening, six hours after, his hearing was, right ear, normal; left ear, 20 inches; and next morning, left ear, 30 inches. I also then examined his nasopharynx, and was surprised to find that the right turbinate had completely collapsed, and the left very nearly so. On the third day, the left ear had improved to 40 inches. Soon the ears both possessed normal hearing, and fifteen months after are still in the same condition.

This variety is probably the result of the shrinking of the large sessile masses we meet with in childhood, which further may shrink to the "central thickening" just described. The "warty" elevations being the remains of the small pedunculated growths.

The last variety of adult adenoids is, in my experience, not often met with over forty. The oldest well-marked case was a patient of sixty-five, whose hearing was only reduced to 4 inches and 6 inches. He was very indignant at being told he had post-nasal growths, and never came back for treatment. The oldest patient I have operated upon was fifty-nine years of age. She had improvement from tinnitus and hearing from ½ inch to 8 inches, which fell back to 4 inches. Another patient, æt. fifty-five, had great congestion of palate and fauces, the tonsils almost met in the mid-line, and the uvula hung down like an antediluvian slug. The hearing improved beyond all expectation from contact and ½ inch to 12 and 14 inches. Unfortunately, two accidents interfered with the result. I ballooned the drum of the best ear (left) by politzerisation, and constantly recurring catarrh militated further against the improvement. He still has right ear 6 inches. I know that the statement of improvement in old and marked cases will be received with doubt, but though it may not be permanent, and though the changes in the middle ear may still slowly progress after the relief of congestion, still the improvement has lasted three and a half years without abatement in some, and with further improvement in others. The improvement in adults is often almost as striking and as immediate as in children. One adult, æt. thirty-one, that I operated upon improved from 3 inches to 16 inches two hours after the operation, and the case of H.A.H., æt. twenty, above quoted, is a still more marked instance.

In young adults, one is often struck with the fact that, as in children, large quantities of adenoids may be present, and yet only very slight

damage has resulted to the middle ear. Such immunity is very seldom met with after thirty years of age, never, so far as my experience goes, after forty years.

There is one point, however, that I should like to lay stress upon. I think it would be advisable to insist upon an adult laying up for four or five days at least after the operation, and great care should be taken to avoid the onset of a fresh catarrh. I have had my results spoilt in several instances by want of attention to these points. The offhand manner in which we treat the operation in children will more often end in disaster if applied to adults, and I could wish that adenoids would be taken more seriously by the profession. Having adenoids done is compared to taking a tooth out—"Oh it's nothing; quite simple, quite harmless." In his anxiety to bestow a benefit the surgeon is too often inclined to minimise the effect of the operation. A fairly large raw surface is exposed, and in a very favourable position for growth of germs or onset of catarrhal congestion. Because the wound cannot be seen, surgeons often forget that it exists. I do not mean to imply that sepsis is the great danger I refer to—it is certainly a risk that is present—but "catarrhal inflammation" is the chief danger, and it not infrequently spoils the result.

I have not recited a long list of cases, nor perhaps have I given sufficient detail, for my notes to have much scientific value, but I wish merely to ventilate the subject in the hope that the presence of adenoids in adults will be more keenly appreciated in the future. I can assure you that the cases quoted above are not exceptional. I can show you many of a similar improvement. Perhaps one result that these notes may have will be to help to impress upon the operator the absolute necessity to operate thoroughly upon young patients. Now-a-days, every one operates upon adenoids with a varying amount of success, from the general practitioner who "scrapes the throats of his patients every six months just to prevent recurrence," to the specialist who carefully removes all at the one sitting. Nothing that we can say or do will prevent such general operating, and it remains for aurists to try and improve the methods adopted, rather than attempt to force all "post-nasal" corn into the one mill.

Recurrence and absurdly incomplete removal are becoming alarmingly frequent, and there is no doubt that the operation is viewed in many instances with increasing disfavour. I always feel inclined to regard recurrence as failure on my part, and not as one of the idiosyncrasies of the patient. Where it runs in families, it may possibly be due to a stronger disposition to recur, rather than a failure to remove, but the aurist who can quote many of such instances can doubtless also refer to many isolated recurrences. A point in the prevention of recurrence that is widely overlooked is the education of proper respiration. When the post-nasals are removed the child will, in many instances, stop mouth-breathing involuntarily, but in a very large number of cases it will not, and must be carefully taught and watched. If I were asked when would I remove adenoids, I should unhesitatingly reply, "Whenever I find them present with some catarrhal trouble." Their presence is bound to cause further trouble quietly and insidiously, and prevent a cure. Why, then, should we wait till marked symptoms appear, and grave, perhaps irremediable, damage has taken place? No case in young adults, is "too advanced" to obtain possible relief, or "too slight" not to need an operation. By politzerisation the "normal" can, in some early cases, be easily obtained, but it is only a question of time before further and more serious trouble will ensue. In advanced cases, age is an all-important factor. With a patient under thirty years I am always sanguine, and up to forty years hopeful, and beyond that expectant, being of course prepared at any time, no matter how favourable a case may

appear, for non-success; for a certain number of such cases must be "always with us."

Granted that an increase of adenoid tissue is common, what evidence is that of its baneful action? First we have to attempt to find some reason for the prevalence of deafness—it has been accepted as a natural process that old people should be deaf. Why so? Why should failing powers be exhibited in destruction of the mechanism of the middle ear almost universally, unless there is some predisposing cause? With cataract there is no comparison in frequency or ossification, or destruction of other tissue or joints. Deafness is accepted by old people as calmly as death—as a natural process. How rare it is to find a person over seventy years with 10 per cent. of hearing. 4 to 6 per cent. is always accounted as good, and only abuse is incurred if a suggestion is made that "perhaps the hearing is a little defective."

I am not, however, going to insist upon the universality of adenoids. I merely suggest that the slow deterioration of the organ of hearing may in many old people have its origin in a slight increase of adenoid tissue.

How do adenoids act in producing catarrhal congestion? Are they an exciting or a predisposing cause? It is hardly the time or place to consider that question, but in whichever class we place them, we admit that their presence is a curse. And their importance, whether large or small, is only relative—they are important always.

The treatment of chronic rhinitis, nasopharyngitis, otitis, media and laryngitis can hardly be placed among the most successful methods of modern surgery; and I think it is largely due to the fact that we neglect to remove the superabundant adenoid tissue in the naso pharynx.

If this is not an exciting cause, it certainly is a predisposing cause, and treatment will be unsatisfactory unless it is dealt with. Since I have constantly removed the remains referred to, the cautery has very rarely been used by me, and only in the case of a much hypertrophied turbinate.

SOME OF THE RARER FORMS OF EYE DISEASE MET WITH IN TASMANIA.

BY

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(Illustrated.)

The following notes and drawings have been taken from some of the cases of eye disease met with during my practice in Launceston, which I thought might prove of interest—some from their rarity, some for other reasons.

The first case which I show you is one of congenital malformation of the eye—polycoria—or the existence of more than one pupil or opening in the iris. (See Fig. I.)

In the left eye of this child the iris was of a light-blue colour, with streaks of a still lighter tinge; there were patches of a muddy-brown colour in it in which were black spaces where the iris was deficient, and where the black appearance of a pupil was seen. There were three such well-marked and fairly large gaps in the iris which were of somewhat triangular shape, with the apex towards the centre of the pupil proper. Through these gaps the bright fundus glow was readily observed with the opthalmoscope. There were, in addition, two small linear slits in the iris through which a faint fundus glow appeared. Altogether, therefore, in this eye there existed six pupils; viz.:—

(1) Central pupil.
(2) Three large eccentric pupils.
(3) Two small eccentric pupils.

The central pupil was somewhat pear-shaped. It dilated considerably with atropine, although not nearly as much as a normal one, owing to the posterior synechiæ which were present.

In the right eye the iris was light-blue, with streaks here and there of a still fainter tinge and patches of a muddy-brown colour. No distinct gaps existed, however, in the iris of this eye, but here and there were dull blackish spots where the iris was very thin, and through one of these a faint fundus glow was seen with the ophthalmoscope. Posterior synechiæ existed in this eye likewise, but the pupil dilated more extensively than that of the left eye.

The explanation of this peculiar condition was that an iritis had developed in intrauterine life, which had not only brought about adhesions to the lens causing the posterior synechiæ, but had also impaired the vitality of the iris, causing it to become thinned and atrophied in places. As the eye developed with the growth of the fœtus, there had been more and more dragging on the atrophic iris, as a result of which rents had occurred in the iris of the left eye, while in the right eye the process had not gone so far.

Polycoria is of rare occurrence, and may be classified according to its casual conditions.

(1) Polycoria, due to the persistence of a pupillary membrane dividing the pupil.
(2) Polycoria, due to the existence of "coloboma with a bridge," in which a coloboma of the iris exists, while a band of tissue (usually pupillary membrane) stretches across the opening, dividing it into two.
(3) Polycoria, due to congenital irido-dialysis, in which the abnormal pupils are situated at the periphery, where the iris is separated from its insertion.
(4) Polycoria due to intrauterine iritis, causing thinning and atrophy of the iris, with the subsequent development of rents therein.

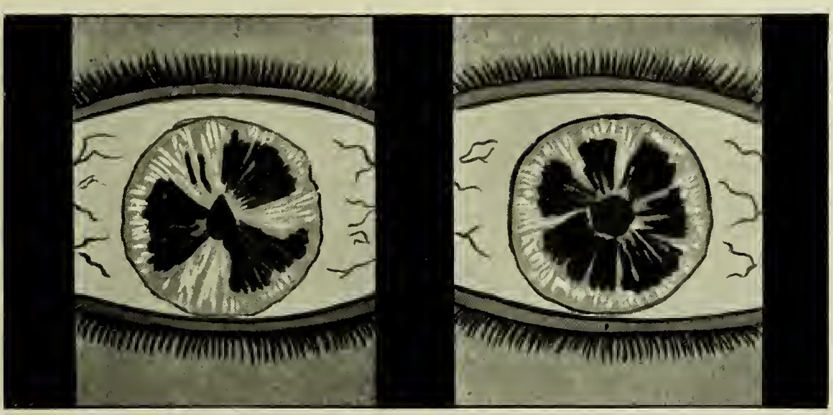


Fig. I.—Polycoria. Due probably to intra-uterine iritis.

Fig. II.—Corectopia of Both Eyes, with Ectopia of both Lenses, one Lens cataractous (pupils dilated with atropine).

Fig. III.—Coloboma of the Choroid in the Macular Region.

Fig. IV.—Congenital Cataract, with fibrous tissue at back of the lens and persistent hyaloid artery. (Gelatine preparation.)

Fig. V.—Metastatic Carcinoma of Choroid, detaching the retina. (Gelatine preparation.)

Fig. Va.—Ophthalmoscopic View.

Fig. VI.—Sympathetic Ophthalmia, of nine months' duration, with hyphæma (pupil dilated with atropine).

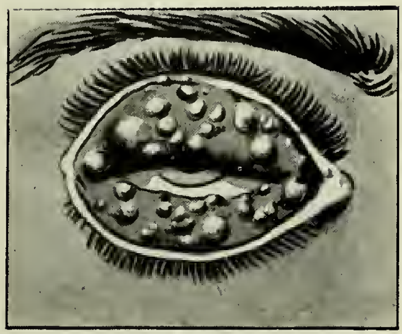


Fig. VII.—Tuberculosis of Conjunctiva.

Fig. VIII.—Tuberculosis of Conjunctiva.

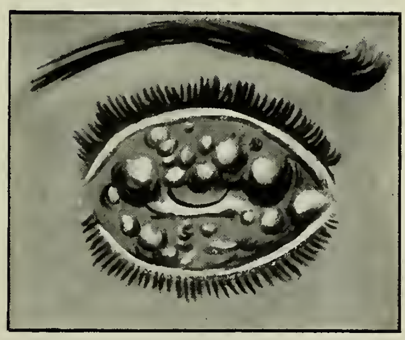


Fig. IX.—Tuberculosis of Conjunctiva.

Fig. X.—Congested and Swollen Disc in Hypermetropia.

Fig. XI.—Swollen Disc in Hypermetropia.

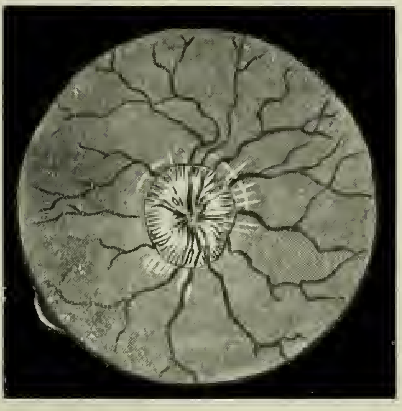


Fig. XII.—Optic Neuritis in Tumour of Brain.

Fig. XIII.—Albuminuric Retinitis from a case of Albuminuria of Pregnancy.

XIV.—Large Posterior Staphyloma in a case of Myopia. 29D.

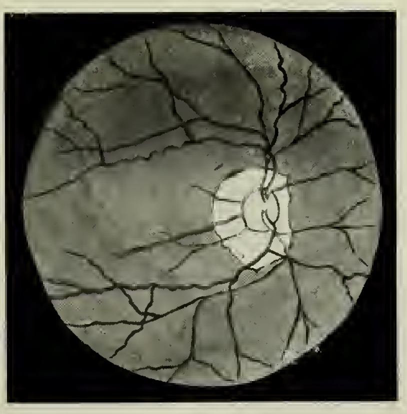


Fig. XV.—Posterior Staphyloma in a case of Myopia. 22D.

Case 2 is an example of another congenital malformation in a child, viz., corectopia and ectopia of the lens. Both pupils were altered in shape and position, one being displaced upwards, the other upwards and inwards; the left pupil was almost transverse; the right irregularly conical. The lenses were also dislocated, one being transparent the other cataractous. (See Fig. II.)

The iris of the left eye had a peculiar transverse striated appearance. Myopic astigmatism existed. There was a definite history of the occurrence of some congenital defect in the eyes of one or two near relatives of the patient. Combined cases of corectopia and ectopia lentis are rare, only about fifty cases being recorded by Damianos, who examined the literature of the subject in 1897.

Case 3 is a representation of a coloboma of the choroid in the region of the macula. There was a history of long-standing monocular blindness in the father of this patient, so that possibly the condition was an hereditary one. (See Fig. III.)

The pathology of these cases is not at all understood; but the condition is most probably due to some degenerative inflammatory change occurring during intrauterine life.

Case 4 is drawn from a gelatine preparation of an enucleated eye of a child. The boy had double congenital cataract and nystagmus, and the pupils of the eyes reacted, but very slightly, to atropine. From one eye a flattened, shrunken, tough, membranous cataract was removed by the forceps, with the result that very good vision was obtained, and subsequently the remains of a hyaloid artery were to be made out ophthalmoscopically. (See Fig. IV.)

In the eye depicted, attempts to remove the cataract were unsuccessful; part of a shrivelled lens was dragged away, but still a dense opacity remained, and as iritis developed and the eye became soft and unhealthy-looking, it was enucleated. On examination a mass of fibrous-like tissue was seen to lie behind the site of the lens, into which mass a hyaloid artery ran. The explanation of such cases is, according to Hess, an atypical embryonic development of the mesoblast from which the vitreous is derived.

The next case to which I draw your attention is that of a metastatic carcinoma of the choroid detaching the retina, and I am fortunate enough to be able to show you not only a representation of the ophthalmoscopic appearance, but also the eye after enucleation. (See Figs. V. and VA.)

The patient was a woman of about seventy years of age, and first consulted me for failure of vision in the right eye.

Examination revealed that V-hand movements, T.n. The pupil was somewhat larger than that of the left eye, while with the ophthalmoscope an extensive retinal detachment was seen, as represented in the diagram.

On further examination it was elicited that the patient had an ulcerating scirrhus of the breast, with enlarged glands, and a metatastic carcinoma of the choroid was diagnosed.

In a fortnight the vision diminished to perception of light, the tension increased to T +, and the pupil became slightly more dilated, and lost all reaction to light; attacks of orbital and supraorbital pain developing, enucleation was advised, and carried out.

The appearance of the eye is seen in the jelly preparation, and is represented in the diagram shown. The growth was thin and shell-like, and extended far forwards in the eye; it was of a faint pinkish-yellow colour, and proved on microscopic examination to be a carcinoma.

While sarcoma of the choroid is the commonest form of intraocular growth in adult life, carcinoma, which is always of metastatic origin, is exceedingly rare. Professor Schobl, of Prague, in his large clinical experience, mentions only one case which he had met with, and Hill Griffith states that only some fifteen cases in all had been recorded.

Case 6 is that of a child suffering from sympathetic ophthalmia of nine months' duration, caused by a neglected perforating wound of the other eye.

Although the disease can hardly be called rare, the peculiar appearance of the eye might, I thought, be accepted as an excuse for my showing it. (See Fig. VI.)

There is, as you will notice, a hyphæma or effusion of blood into the anterior chamber. There has also been an iritis of some duration, which has caused extensive posterior synechiæ (the pupil is dilated with atropine to its fullest extent), and some obscuration of the pupil by the inflammatory exudate which has taken place.

The iris has become mottled and discoloured, so that from an eye that was originally a blue colour, it has changed into one of a greenish appearance, and has lent the eye a peculiar greenish circum-corneal haze.

Ophthalmoscopically nothing could be made of the fundus owing to the dense vitreous opacity which prevailed.

Cases 7, 8, and 9 are examples of a comparatively rare disease—tuberculosis of the conjunctiva.

In the first case, which occurred in an infant, the lids of the affected eye, especially the upper lid, were swollen and of a dull reddish appearance, externally, and there was a muco-purulent discharge. (See Fig. VII.)

On everting the upper lid the conjunctiva was found much thickened, and there were numerous nodules scattered over it, varying in size from a pea to a pin's head; some of a pinkish, others of a pinkish-yellow appearance. On cutting some of the larger ones gelatinous material could be scraped out, while others seemed to consist of granulation-like tissue; here and there small ulcerated patches were scattered. In the lower lid a similar, though less marked, condition existed, the nodules being fewer and smaller. There was no enlargement of the preauricular or other glands.

Examination of a nodule showed it to consist of granulation-like tissue, but unfortunately no complete bacteriological examination was carried out to demonstrate the tubercular character.

Clinically, however, the condition was typical of tubercular disease of the conjunctiva. The treatment adopted was free removal with the knife and sharp spoon, and the eye improved considerably.

Some months afterwards, however, the child became suddenly ill, and died of tubercular meningitis.

Recently I have seen a second infant in the same family suffering from the same disease, with this difference—that it was in a much earlier stage. Both eyes were affected, and I show to you the representation of one of them. (See Fig. VIII.)

Externally the lids had a reddish thickened look, but there was little or no discharge. On everting the upper lids, they were found to be irregularly thickened and to show a few small greyish elevations, on puncturing which purulent material escaped, with one or two reddish ones, which on puncture yielded a more gelatinous matter.

In the lower lid of the eye there was a row of small pinkish-grey granules.

In Case 9, in which only one eye was affected, the appearances were similar to those of Case 7, although not so marked, the nodules being fewer and smaller. and the thickening of the conjunctiva less. There were enlarged strumous glands of the neck. (See Fig. IX.)

The subsequent history of the case I cannot give, as the child left the State.

Tubercular disease of the conjunctiva is of comparatively rare occurrence; according to Eyre it is met with in the proportion of about one in three thousand eye cases; but in Australia, where tubercle is altogether less frequent than in Great Britain, the proportion must be, I think, still less.

It is usually unilateral, although both eyes may be affected; it attacks more frequently the palpebral conjunctiva; the bulbar conjunction may,

however, be diseased, and the cornea may become involved, a superficial keratitis developing. There is, as a rule, an absence of pain, although a good deal of discomfort may supervene from the swelling and the discharge.

The type of the disease may vary somewhat; thus, it may assume—

(1) A trachomatous character, as illustrated in those two cases.

(2) A lupoid character with nodules of jelly-like lupus tissue, some of which may have broken down and ulcerated.

(3) An ulcerative character with small miliary ulcers.

The adjacent lymphatic glands, especially the preauricular, may become involved. Although the disease may be associated with general tuberculosis, it is very frequently strictly localised, when it is in all probability caused by the direct infection of an abrasion of the conjunctiva by the tubercle bacillus.

The treatment, which consists in free eradication by the knife and curette, together with the use of constitutional remedies, may meet in some of the earlier stages with a measure of success.

Cases 10 and 11 are illustrations of congestion of the optic disc. associated with hypermetropia, to which may be applied the designation of optic pseudo-neuritis. (See Figs. X. and XI.)

In the first of these the disc was remarkably hyperæmic, and the nasal margin blurred. In the second case there was swelling of the papilla.

Both cases were associated with H., the latter case with H.As., and notwithstanding the use of the correcting lenses, the discs remained for months *in statu quo*. In the latter case the swelling of the disc disappeared some eighteen months afterwards, but it still remained much congested; in contrast with these is shown Case 12, of optic neuritis due to a brain tumour. (See Fig. XII.)

Case 13 is one of retinitis developing as a sequel to the albuminuria of pregnancy. In the one eye the congested condition of the disc, with its margin somewhat blurred, and the stellate figure at the macula, were noticeable, as represented in the diagram. The vision was reduced to $\frac{6}{60}$. (See Fig. XIII.)

The other eye showed only a slight whitish spotted appearance at the macula, and the disc was not so congested. Vision $\frac{6}{12}$. Under treatment vision improved in both eyes. In comparison with ordinary albuminuric retinitis, the prognosis of which is most unfavourable, the duration of life being on an average about two or three years (six years being the longest amongst the poorer, and eleven years in the richer classes), that form which is due to pregnancy is more hopeful, recovery even taking place on removal of the cause; but, on the other hand, repeated pregnancy may light up the disease in a more aggravated degree. I have seen several of such cases in Tasmania, all of which, so far as I could trace them some months afterwards, had improved considerably both as regards their eyes and general health.

Cases 14 and 15 are illustrations of some of the fundus changes found in high myopia. The myopia was 29 D. in one case, 22 D. in the other, and in both there were extensive degenerative changes in the posterior part of the eye. (See Figs. XIV. and XV.)

In one eye there is a very large staphyloma posticum with extensive choroido-retinal disease, which has involved the macula; in the other eye the changes, though similar, are not so advanced.

Among the cases of myopia I have met with in Tasmania, the former is, so far, the largest. The history of many of these cases of high myopia in this State is a most unfortunate one, their eyes having been neglected or handed over to the tender mercies of some travelling optician, whose treatment has consisted of giving them a pair of unsuitable spectacles, and then leaving them, with the result that their myopia has too often rapidly increased, and become associated with extensive changes in the posterior part of the eye, reducing them to a state of comparative blindness; whereas proper treatment might have preserved for them a fair degree of sight.

BIFOCAL LENSES.

BY

T. K. Hamilton, M.D., (Univ. Dub.), F.R.C.S.I., Adelaide.

The public has evidently come to appreciate at last the comfort and convenience of Bifocal Lenses, as shown by the increasing number of individuals who have, of late, adopted this combined method of vision correction. Some few years ago it was quite an unusual thing to see a person wearing bifocals, and the few who did thus sacrifice appearance to convenience and utility made themselves somewhat conspicuous by so doing, for the older combinations of the two lenses produced anything but a pleasing effect. All this has now, however, to a great extent changed, as the newer varieties of bifocals are not only more presentable in form and shape, but the application of sounder optical principles has been brought to bear on their construction, and certain difficulties, which up till recently prevented them coming into more general use, have been overcome. The ophthalmic surgeon, with the aid of the scientific optician, has done much to secure this end; and utilitarian, and perhaps fashionable considerations as well, have done the rest.

The oldest form of bifocals—that in which the two lenses were of equal size, and joined in a straight line running across the centre—has now been quite superseded, and one rarely sees such combinations worn at the present time. Probably the first change made was to cement one glass on top of the other, and I am indebted to Dr. Kent Hughes for following up a reference I gave him to bifocals, as made several years ago by the *Société des Lunétiers* in Paris, and for discovering that their method was merely the cementing one. The next improvement in the method of construction was in the direction of grinding the two lenses on the one piece of glass. The adoption of this method dates back some considerable time, as well as I can gather from any available information on the subject, and from what Mr. Köhler, of Flinders-street, Adelaide, my optician, tells me, of methods in vogue for years past in Germany and Paris. As far as my own practice is concerned, I have been using this kind of combination now for upwards of ten years, and the glasses ground on this plan for me in Adelaide have done infinite credit in their manufacture, surface, polish, &c., to Mr. Köhler's skill and workmanship. I thought when I first used these glasses that they answered all expectations, and fulfilled all the indications possible under the circumstances. This opinion I held up to about three years ago, but, at the same time, I had always a feeling in my mind that in them we had not quite gained all that was possible to attain to in the way of optical perfection, and this feeling was, from time to time, accentuated by noticing that a certain number of my patients found very considerable difficulty in getting accustomed to the use of these combinations; and a certain other, though proportionately a smaller number, never could or would get into the way of wearing them. This was to me extremely disappointing, as both my optician and I at one time thought that we had reached the height of perfection as far as mechanical technique, cosmetic effect, and utility, all combined, were concerned. Further experimentation, however, as time went on, led us to conclude that this, what seemed to us mathematically-perfect arrangement, was really not so in its practical application; and herein lay the explanation of the difficulty, which I have just referred to, which patients manifested in becoming accustomed to their use.

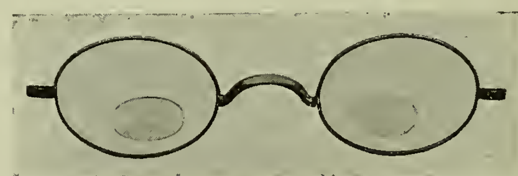
The objections to this one-piece, or "ground," bifocal are:—(1) The prismatic effect they produce; and (2) their limited range for distant vision. That this variety of bifocal always produces some prismatic effect is a fact

beyond dispute, and this is due to the mechanical impossibility of centering both spherical surfaces upon the same piece of glass. The specimen No. B which I exhibit is a one-piece lens made by my optician some years ago. Its prismatic effect is almost nil, but the dispersion rays are too great, so the glass is almost useless, and it is, moreover, very difficult to make. Dr. Kent Hughes, in his first contribution (*Australasian Medical Gazette*, September 26, 1897), claimed originality for his optician—Mr. Pugh, of Fitzroy—in devising this one-piece kind of bifocal, but, as I pointed out in my letter in the same journal of November 20, this method of using a periscopic lens, and grinding into the posterior (concave) surface, is by no means a new idea, as my optician has been grinding the same for many years past, and in them the prismatic effect is lessened, but not to any great extent. Dr. Kent Hughes states that every combination is possible except + sphericals with + cylinders. He comes to this conclusion, doubtless, on account of there being no concavity to work into, but this can be overcome by making a toric lens, thereby producing a meniscus (as in No. A exhibited). A "toric" lens is a surface engendered by a circle, which turns about an axis situated on the plane of a circle. These lenses have never been manufactured extensively, their cost being considerable, and they are chiefly used when lenses of high power are required, and when a meniscus is of advantage. This sample (No. A) has + 9·00D sphere on one side and crossed cylinders—5·00DX—3·00D = on the other side, giving the effect of a sphere + 6·00D − 2·00D cylinder. Supposing a combination were required giving a sphere + 4·00D = + 2·00D cylinder to give the periscopic form to this glass, it can be done by working crossed cylinders + 8·00D and + 6·00D on one side, and grinding on —2·00D sphere on the other. Lastly, there is no more difficulty in working in a compound astigmatic bifocal than there is an ordinary spherical combination. So under these circumstances, and with the experience extending over several years which I have had of my optician's work in manufacturing these "ground" bifocals of every variety, I fail to see what claim Mr. Pugh has for either priority or originality in their construction.

The second objection to these one-piece bifocals, viz., that their range for distant vision is too small, also constitutes a very serious difficulty, and one which cannot in any way be surmounted. That the near-vision portion of the combination should occupy much the larger part of the whole lens is obviously incorrect; just the opposite to what it should do, and it, at the same time, serves to accentuate the other defect in connection with the prismatic effect. As long ago as the year 1882, Noyes, of New York,* recognising the necessity of making these glasses so that the upper and weaker part should occupy the greater part of the glass, adopted the "cemented" method of construction, making the separation between the two portions a curved line, with the concavity downwards, but here again a difficulty presented itself with us, owing to the liability of the presbyopic portion becoming detached from the other in our hot summer weather by the softening of the cement. To overcome this difficulty, my optician has adopted a new method, which gets rid of all the cementing difficulty, and at the same time provides for the correct centring of each portion of the glass. The construction is as follows:—The lower, or presbyopic, segment is not constructed by cutting a single glass into two parts to form the corresponding segment of the whole, but each segment is cut from a separate lens, and has its own axis complete, so that the optical centre is clear of the line at which the upper and lower segments are joined together. When glasses are thus arranged, the wearer is not troubled with seeing the boundary-line, for he soon acquires the habit of looking above and below it, without noticing its presence. Not so with

* *Diseases of the Eye*, p. 61.

two halves cut from one piece, neither of which has any optical centre. So much for the centering of each portion. Their fixing in the frame is provided for by the following simple and ingenious plan:—The smaller segment is ground with a tongue on its convex edge, which fits into a groove on the concave edge of the larger portion. This fixes the two firmly together, and allows of their being easily separated by opening the rim of the frame, should one require to be replaced at any time by a new lens. This is the method of construction of bifocals which my optician has been adopting lately, and they have given me more uniform satisfaction than any other variety I have hitherto used. But even this combination, approaching, as it does, so nearly to optical and mechanical perfection in its construction, has still one defect, and that is, that the wearer, looking through the presbyopic portion, feels a certain awkwardness in going downstairs and off a curb on the footpath. To overcome this difficulty, Weeks, of New York,† has still further limited the area devoted to the shorter focus by applying a small oval lens, which he calls a "paster," to the distance lens in such a position that the wearer can look under it when going downstairs, &c. After making numerous experiments, he has adopted the following arrangement of the two lenses, which he finds gives the maximum service with the minimum discomfort. On the face of the distance lens he cements a "paster" of oval shape, which measures 10 mm. in its vertical, and 15 mm. in its horizontal diameter. This gives a field at the reading distance of approximately 19 cm. in the horizontal and 12·50 in the vertical meridian. If the oval disc is placed 2 mm. above the lower edge of the distance lens, it will permit a clear distance vision below sufficient to enable the wearer to see the kerb, descend stairs, &c., without trouble; in fact, to be entirely free from the annoyance in this particular occasioned by the ordinary bifocals. The "pasters" are placed a little to the inner side of the centre of the distance lenses, so that the visual lines in reading will cut the centres of the "pasters." It is sufficient, the originator finds, to place the optical centres of the portion of the lens for reading at the centre of the "paster." The dispersion rays of light occasioned by the edges of the "paster" can be minimised by making the edge very thin. Weeks has found these glasses excellent for all purposes, and particularly serviceable in his operative work. My optician has made me this pair, which I exhibit.



We find they require very accurate fitting, and they must also be considerably tilted, so that the plane of the lenses is perpendicular to the visual axis, especially when the wearer is looking under the reading lens. The same objection, of course, obtains in this combination with reference to the necessity of using cement, as in the ordinary cemented bifocals, but inasmuch as the "pasters" are so small, light, and thin, they may not become so easily loosened from their attachments, as a heavier piece of glass would. It remains to be seen if this design of Weeks' will prove as serviceable as it is optically correct. If it does, we may find that it will supersede all the other combinations. From the designer's high recommendation, and any little experience I have had of their use up to the present, I feel disposed to give them a more extended trial.

† N.Y. *Medical Record*, Aug. 24, 1901.

NOTES ON CATARACT-EXTRACTION.

BY

F. Wallace Mackenzie, M.B., C.M. (Edin.),
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During the period of fifteen years in which I have been working at diseases of the eye, I have extracted the lens on account of cataract three hundred and fifty-four times. These were all senile or traumatic cataracts, and it has been my practice not to adopt the method of extraction in traumatic cataracts in persons under the age of thirty-five years. In young people the method of solution has proved quite satisfactory, and with due precautions it is free from danger. In choosing cases for operation I have mainly followed the old rule of leaving alone those cases in which there is no perception of light, and also those in which there has been a good deal of pain while blindness was coming on. Most of the absolutely blind cases are secondary to glaucoma in one of its forms, or to some disease of the retina or choroid which has destroyed the sight. Cataract following sympathetic ophthalmia is associated with iritic adhesions, and often a "false" membrane over the pupil, and is a result of extensive disease of the uveal tract which has already greatly impaired, if not destroyed, the sight, and the removal of the opaque lens gives little if any improvement in vision.

In my earlier years, and chiefly among the Maoris, I met with a considerable number of cases of cataract which had been going on for a great many years; some of these shelled out easily; but many consisted of a milky fluid with a hard nucleus. These cases have a characteristic appearance, the lens being almost of a chalky whiteness.

In a country where means of communication were bad, and good operators on the eye rare, it often became the duty of the general practitioner to extract the opaque lens of his patient. Many of these operations were successful, but a considerable number were failures, and I have extracted thirty-two opaque lenses from persons who had previously lost one eye from an operation of cataract. Of these, twenty-five had lost the left eye. This seems to indicate that it is more difficult to operate on the left eye than the right, and shows how necessary it is to acquire equal skill with both hands in order to get the best results in cataract-extraction.

I am not greatly impressed with the value of any of the processes for artificial maturation of cataract, and prefer to extract an immature cataract in those cases in which there is bad sight or none in the other eye to depending on a process of artificial ripening. The formation of an artificial pupil, six weeks or two months previously, may perhaps diminish the risk of the operation; but I have not done this for some years, and have found that one operation has proved as successful as two. I do not believe that cortical matter in the anterior chamber of the eye ever sets up either iritis or suppuration—these complications are due to septic infection—and in fact, when the hard part of the lens is removed the soft cortex need not cause much anxiety. It can either be removed in pieces with a spoon or washed out with a douche of salt water. It is the nucleus of the senile cataract that causes trouble, the soft cortex is as easily treated as a traumatic cataract in a child.

Operation.—I use a 4 per cent. solution of cocaine hydrochlorate to anæsthetise the eye, and have always been satisfied with it. A drop of solution of eserine is put into the eye a few minutes before beginning the operation. The eserine helps to draw the iris out of the angles of the wound in the cornea after the lens has been removed, and probably assists

in preventing the occurrence of prolapse of the iris. Up till the present time I have always combined a small iridectomy with the extraction, except in those few cases where an iridectomy has been done previously. The object of the iridectomy is to allow of the escape of aqueous humour through the wound without the iris being carried with it.

I use a von Graefe cataract knife, making the puncture 3 mm. below the upper margin of the cornea on its outer side, and the counter puncture as near as possible at a corresponding point on its inner side. The incision is completed just below the corneo-sclerotic margin above. The distance can be measured sufficiently accurately by laying the knife on the cornea just its width below the upper margin. The incision is made in the cornea all the way, then there is little likelihood of escape of vitreous humour. I incise the lens with a sickle-shaped cystotome, and the shape of the incision does not matter much as long as the incisions are free enough, and placed so that a piece of capsule cannot prolapse through the wound. If much difficulty is met with in expressing the lens, it is most likely that the opening in the capsule or the cornea is not wide enough. If the lens does not come out quite easily after it presents in the wound, I enlarge the corneal wound with a pair of scissors, and help the lens out by sticking the cystotome into it.

When the lens is fluid with a hard nucleus, the nuclus if small cannot be expressed in the usual way, and it is too small to hook up with Taylor's vectis. After the anterior chamber has been cleared of the milky fluid the nucleus can be readily caught with a sharp hook, or lifted out with a scoop. It is best to have the pupil dilated when removing the nucleus, so in suspicious cases I dilate the pupil with atropine before commencing the operation, as the cocaine dilatation disappears when the aqueous humour is let out.

Sometimes in spite of having a wide enough incision in the cornea, and in the lens capsule, the cataract refuses to come out with a safe amount of pressure. Then a Taylor's vectis must be passed behind the lens, when it is easily lifted out. The vectis almost slides down with its own weight, and very gentle pressure must be applied to it, and the handle held very lightly, as it has to feel, as it were, its way down in the proper place.

Escape of vitreous is due, I believe, generally either to the corneal incision being made too far back—and there is a tendency to make the counter puncture too far back unless care is taken—or else it is due to roughness in expressing the lens or in removing it with the vectis. If the vitreous is prolapsed before the lens is extracted, the lens should be removed with the vectis; if after the lens has been removed, then, if the prolapse is not very large, it is a good plan to bandage both eyes lightly and leave it alone. Next day it will probably have gone back. If it has not gone back it can be snipped of with a pair of scissors, and the dressing applied again. I believe that very little harm results at the time from even a considerable loss of vitreous, but it is an accident that ought to be avoided if possible, as it is probable that it leads to floating opacities later on.

Complications after my operations have been rare. Once an eye was lost by suppuration of the globe. This was due to an attempt to sterilise the instruments in solution of carbolic acid. One eye was lost by an attack of irido-cyclitis. This was in a Maori woman who had lost the other eye a short time before through an operation for cataract in Wanganui. This was probably a case of sympathetic inflammation. In one case the patient had a marked increase of tension coming on eight days after the operation. There was intense pain and considerable swelling of the conjunctivæ. Evacuation of the aqueous humour gave immediate and permanent relief, and the case did well afterwards. Five cases had no improvement after removal of the cataract. In three of these the opaque lens was the result of sympathetic

inflammation, in one there was extensive separation of the retina, and one case developed interstitial keratitis. I treated him for some weeks, and then he consulted an Indian oculist, who took three skins off his eye.

In preparing the eye for operation I have not carried out any of the elaborate processes adopted by some surgeons for the purpose of rendering the conjunctival sac aseptic. I believe that a healthy eye is not a good soil for its own indigenous germs to grow in, and that they do not attack injuries and wounds in their own eye. The septic processes which take place in previously healthy eyes after operations, are due to fresh germs introduced by the surgeon, and can be avoided every time if proper care is taken to clean instruments and fingers thoroughly. Before operating I clean the lids and eyelashes carefully with soap and water, and wash the conjunctival sac out with solution of boracic acid or bin-iodide of mercury. Where the patient has dacyro-cystitis, I wash the sac out for a week with a solution of chloride of zinc, 1 gr. to the ounce, and, after the operation, dust the eye with iodoform every day. So far this method has prevented any septic trouble. After the operation I put on two fine strips of isinglass plaster, to keep the lids at rest; if the patient has to go outside I cover this over with a pad of absorbent wool and a bandage. Occasionally, when the conjunctival flap has not been left on the corneal flap, the patient feels as if there were a piece of grit in the eye for a good many hours; in these cases it is well to tie up both eyes for the first three days.

I do not put any drops in the eye for three days after the operation, and I have frequently left the first dressing on for six days. It is well, however, to open the eye at the end of the third day, and put in a disc of atropine to dilate the pupil.

I have not tried extraction without iridectomy. The results with the modified flap and a small iridectomy have been so good that it has not seemed advisable so far to change. No doubt the advantages of an intact iris are great; but there are some risks which the iridectomy does away with.

In my work I have endeavoured to carry out the aseptic system in principle, and at the same time to avoid irritating the eye with drugs. This has been carried out by endeavouring to avoid putting germs into the eye rather than by attempting to kill those already there. In my operations I have followed, almost in every detail, my old teacher, Argyll Robertson, as I have followed his principles in treatment, and I still look upon him as the first operator of his day.

I am aware that a great deal of what I have written most of you are well acquainted with, and that there are some who will disagree with me in some of the details, but one still comes across patients with one eye who have had the other removed because an operation had gone wrong, and I hope those surgeons who have been in the habit of blaming the patient for catching cold, or the nurse or dresser, or the patient in the next bed who had a suppurating sore, will put on the cap and clean their fingers and instruments more carefully.

THE EXAMINATION OF RAILWAY EMPLOYES IN VISION, COLOUR SENSE, AND HEARING.

BY

Hugh L. Murray, M.R.C.P., F.R.C.S. (Edin.).

The necessity for an expert examination of railway employés periodically in vision, colour sense, and hearing, has been recognised by the profession for some considerable time, and no apology is needed, I think, in bringing this vital and important subject again before Congress. At the same time, it seems almost superfluous to ask a congress of medical men to affirm such a necessity. The continued use however, by managers of railways in Australia of unscientific and misleading examinations conducted by amateur oculists drawn from the railway officers, has prompted me to bring this question forward, and to ask you to carry the following resolutions. When we consider the rapid rate at which a modern railway train frequently travels; that it carries hundreds of passengers, besides a cargo to the value of thousands of pounds; that, as many accidents have shown, it may be utterly wrecked in a few seconds by one of many various slight mishaps; and lastly, that the recognition of any danger ahead in time to enable it to be averted is dependent upon the keenness of sight and correctness of colour-vision of one or two men on the look-out: when we consider these points, surely we are entitled to demand that every possible precaution that knowledge and science can suggest, should be exercised, and that no pains should be spared to debar the entrance into responsible positions of men whose defect is often not from any fault of their own, but from congenital imperfection.

A thorough examination is in the public interest, because it has a right to demand the adoption of every means to lessen the risk of travel; in the interest of railway employees, because they are usually the first to suffer in the disasters which their defects may have produced; and in the interest of the railway owners, because they have to repair the damages and satisfy the claims of the injured.

It may be true that but few accidents have up to the present been found to be due to visual defects, but it will be acknowledged by all that when so much life and property are at stake, it would be madness to overlook an extremely probable, though recently discovered, source of danger.

I am not aware of a single case where a serious catastrophe has occurred in which the question of the vision of those charged with the "look-out" has been thoroughly inquired into. And until the eyesight of all responsible persons is systematically and periodically examined by medical men, it is entirely misleading to say that few accidents are caused by defective eyesight, because few have been traced to that cause. It may afford a reasonable explanation of many accidents the cause of which no satisfactory reason has been found, and it is only men "behind the scenes" who are cognisant of the large number of such accidents that do so occur on our railways every year.

A semaphore signal has a movable arm about 4½ feet in length, and from 7 to 10 inches in width. When seen at a distance of a little over 800 yards such a signal will subtend with the average width, the same visual angle as the width of Snellen's XX-feet test letters at 20 feet—that is, one minute; but as the length of the signal is more than five times its width, its length will subtend a little more than the standard angle of five minutes, which corresponds to the height of Snellen's test letters, and is the visual angle under which they should be read by the normal eye. A signal of this shape has been found the best for conditions of service, and if it be placed against a background of clear sky, its position, horizontal for "danger," or at

an angle with the horizon for "safety," can be easily seen under favourable conditions of atmosphere at a distance of over a mile. Such conditions are not always found. The atmosphere may be hazy, foggy, misty, smoky, or dusty, or the background may be a building, a tree, a green or brown hillside, and then the visibility of the signal is seriously interfered with. In order to assist railway men under such conditions, another signal, or "distant" signal, is placed 400 or 500 yards from the "home" signal, and is operated to correspond with it. In bad weather the position by day, or the colour by night, must be seen by the driver as he passes this "distant" signal, and there is no time for hesitation, in recognising it if "danger" be shown, for if the train be moving at the rate of 40 miles an hour, he will need the whole distance between the "distant" and "home" signal in which to stop his train, and there will be only twenty-three seconds before the train, if unchecked, will have reached the danger-point. It is therefore essential not only that our railways should be equipped with the best of signals and safety appliances, but also that the men employed in the operation of trains should have such acuteness of vision and colour perception that they can recognise these signals quickly and accurately, even *under unfavourable conditions*.

The introduction of scientific examination of railway employees has always been opposed by the men, principally on the plea that the tests are not "practical," and in consequence in Australia the authorities of the principal railway systems, viz., New South Wales and Victoria, have adopted a so-called "practical" test in the open air with a semaphore.

When Dr. J. W. Barrett and I were appointed to examine the railway employees of Victoria in 1898, we conducted a series of experiments in the open air with semaphores on three different occasions, and there were such striking differences in the results, varying with the state of the atmosphere and the background of the signal, that to carry out vision tests in the open air appeared to us utterly impracticable, and the results completely unreliable. Unless the *worst conditions* which a man has to contend with when *on duty* are obtained, especially as regards background and atmosphere, and the man tested under them, any examination under easier conditions is no test of his ability to encounter the severer ones. It is a very different thing seeing a signal on a foggy, misty evening, with a tree or station-building behind it, from seeing the same signal on a hill with a blue, clear sky behind it, on a beautifully clear day.

In our experiments in the open air we found that the distance at which a person with normal sight could see the semaphore varied from 900 to over 2000 yards, according to the conditions of atmosphere. The arm of the semaphore could be seen 2000 yards away one day, and at the same place on another day it could not be seen more than 900 yards distant. The results with varying backgrounds were equally striking. Thus, no standard can be laid down for outdoor testing. It can never give the same certainty as indoor examination, and unless it is accurate it is useless.

In my investigations and enquiries as to the procedure in other countries, I can find no mention of any out-of-door examination in the continents of Europe and America. The North-Eastern Company of Great Britain, however, tests certain rejected candidates in the service by signals at Pitmoor Junction, at 1000-yards distance, so that their cases may receive special consideration. There is also mention in my correspondence with the Caledonian Railway Company of a "practical distance test," but what is meant by this term is not explained. These are the only instances, outside of Australia, of anything of the kind that I have heard of.

All candidates for railway service should, in my opinion, be examined with a view to their permanent fitness. Surely it is bad policy for railway departments to admit men who are certain to be rejected in a few years on account of defective vision. There is no injustice, in requiring a high

standard for men seeking employment, and there is no difficulty in obtaining such men. The trouble and injustice come when men are discharged after years of faithful service, for defects which could have been discovered when they entered, if a careful and complete examination had been made at that time. On looking over my notes, I find that about half the men rejected by the Victorian Railways during the past four years have been so rejected on account of errors of refraction. If these men had been carefully examined by an oculist before starting railway work, they would have been rejected then, and would now be earning their living in some other sphere of life. As it is at present, they are allowed to work their way up the ladder of promotion, until at forty or forty-five years of age, after probably twenty or more years of service, they have attained a lucrative and responsible position, requiring all their senses to be keen and accurate. Now it is found that their vision is failing, and that signals cannot be seen at a necessary distance. These men have, therefore, become a danger, and a menace to safety. After all their years of railway service, they are unfit to start life all over again in another groove, and they are given the alternative of retiring from service when they ought to be at their period of greatest usefulness, or of being reduced in position, and pay, to some position where their defect is of no moment.

Looking at it from the owners of railways' point of view, an examination such as I am advocating should commend itself to them as employers of labour. When a lad is taken on to learn railway work, he is for a number of years an apprentice. While he is learning his business, his labour is not worth his wages. If by the time he is expert, and his labour is worth more than his pay, he has to be retired on account of failure of vision, he is not nearly so valuable a servant as if he had another fifteen or twenty years of service to give his employer.

Consequently, I consider the present state of things should be altered, and I have ventured to again broach this subject at the Congress, hoping that an emphatic expression of opinion from such a representative body will have sufficient weight with the "powers that be" throughout Australasia that it will result in a radical change to better and more scientific methods.

I had another object in bringing this subject forward, viz., to try and get a uniform standard of vision and hearing adopted throughout Australasia. I have with me the standards we are using in Victoria. That for men in the railway service is much the same as that adopted by most European railway companies. That for candidates for employment in the service you may possibly think too severe, but if we can get men up to it (and there is no difficulty in that), there is no harm in adopting the highest possible standards. In our open-air experiments with a semaphore we found that under some circumstances, especially where there was an unfavourable background to the signal, the distance at which the normal ($\frac{6}{6}$) eye could read it was under 600 yards, a distance at which railway men consider it necessary to see a signal, in order to stop a train before reaching it. As many of our senior drivers and guards are well up in years—sixty and thereabouts—it appeared to me necessary, in order that they should have $\frac{6}{6}$ vision at that age, to demand practically emmetropia, and in my examinations for candidates for service in the past four years I have only passed such men. There has been no dearth of candidates, and consequently no difficulty in filling all vacancies.

I therefore submit my standards to you, and if you approve of them, will move the following resolutions:—

(A) In the opinion of this Congress—

1. All employés on railway lines or in any way connected with railway traffic should be examined periodically by medical

men skilled in eye work, and the standards of vision attached are considered necessary for such employés.

(*a*) All the staff directly concerned with the running of trains should be re-examined about every three years; all others about every five years.

(*b*) All men connected in any way with an accident should be thoroughly examined in vision, colour sense, and hearing.

(*c*) Every man passing from one grade to another where more accurate vision is required should be examined before taking up his new duties.

(*d*) All men who are known or suspected to be heavy smokers or drinkers should be examined at short intervals.

(*e*) All men wearing glasses should be examined and glasses tested at regular intervals.

(*f*) All men who have had any serious illness or injury should be examined before resuming duty.

2. All candidates for railway service should be examined with a view to their permanent fitness, and the standards of vision, &c., as attached, are considered necessary, and are suggested for adoption throughout Australasia.

3. Any so-called "practical test" held in the open air, such as is used in New South Wales and Victoria, is unscientific, inaccurate, unreliable, and should be abolished.

(*B*) That these resolutions be forwarded to the Premiers of each of the States and to the secretaries of each of the railway systems throughout Australasia.

Standards for Employés on Railway Lines.

Vision.—Class A, (men directly concerned with the running of trains), $\frac{6}{6}$ in one eye and at least $\frac{6}{12}$ in the other.

Class B (men concerned with traffic to a less responsible extent), $\frac{6}{6}$ in one eye and at least $\frac{6}{18}$ in the other. A limitation of the field of vision or any diseased condition of the eye which might produce rapid lowering of vision will disqualify.

Colour sense must be perfect for all employés.

Hearing must be at least $\frac{1}{5}$ in one ear and $\frac{1}{10}$ in the other.

Standards for Candidates for Employment.

The eyes and ears of all candidates for admission to railway service will be thoroughly examined. The refraction of each eye will be worked out, and departures from normal will be allowed in some grades to the extent shown below. There must be no evidence of progressive disease of eyes or ears, latent or otherwise.

Vision.—Class A, viz., all men who are or may be concerned in the actual running of trains. Vision must be normal, $\frac{6}{6}$. Refraction must be normal, except latent hypermetropia up to 1D will not disqualify. In compound hypermetropic astigmatism, the sum of correcting glasses must not exceed 1D, of which ·50 astigmatism only will be allowed.

Class B, viz., men concerned with moving traffic to a less responsible extent. Vision must be normal, $\frac{6}{6}$ in each eye; $\frac{6}{9}$ in each eye will not disqualify, provided it is not accompanied by latent hypermetropia or evidence of progressive disease. Refraction must be normal in each eye, except latent hypermetropia up to 1·25 D will not disqualify. In compound hypermetropic astigmatism, the sum of the correcting glasses must not exceed 1·25 D, of which not more than ·75 astigmatism will be allowed.

Class C.—Engineering students and draughtsmen. Vision must be normal, $\frac{6}{6}$, with or without glasses.

Refraction.—Myopia beyond 3 D will disqualify.

Hearing.—Class A: Hearing must be at least $\frac{2}{3}$ normal. Class B: Hearing must be at least $\frac{1}{2}$ normal. Class C (including all trades, boiler-makers, strikers, &c.): Hearing must be at least $\frac{1}{5}$ normal.

Colour Sense.—The colour sense of all persons appointed to railway service in any grade must be perfect. Any departure from normal will disqualify.

Discussion.

Dr. Barrett said that the proper examination of the vision of railway servants or those engaged in the mercantile marine was most important and most difficult. No words were needed to emphasise its importance, but it was difficult because of the inability of the railway managers in the Australasian States to realise the risks they were taking. There was no lack of applicants for the services, and the managers of those services were in the singularly fortunate position that they could, if they would, choose men whose visual acuity was perfect. They could only do that, however, by submitting those men to a proper ophthalmic examination, either at the hands of an expert, or of some one under the direction of an expert. Such an examination was not insisted on, and it is quite possible that men with serious eye disease may be admitted into the services, and quite likely that men with latent eye disease are admitted into the services. It is a short-sighted policy from an economical point of view, for those admitted with latent or actual disease are sooner or later bound to be a source of trouble to their employers. In his connection with the Victorian Railway Department, he had personally demonstrated to the officers of that department the absurdity of what was called the practical test, viz.: the estimation of the distance at which a man could see the arm of a semaphore. It had been clearly shown that in three days the distance varied frequently, owing to various conditions of the atmosphere, and that there was no result obtained in this way that would not be better obtained by testing under the ordinary scientific conditions. Nevertheless, he understood that this practical examination had been largely employed for those rejected by the medical officers of the department. As an instance. Quite recently a gatekeeper was killed at the Malvern Crossing, near Melbourne, in circumstances as follows:—He had only one eye, and had been condemned by the medical officers. In the early morning he left the gate-house to open the gates for an approaching train. Before he could do so, the engine struck the gates, and a portion of the gate struck the man and killed him. No positive proof can be obtained, but the fact that a man with one eye, who is necessarily a bad judge of distance, made a mistake of this sort, strongly suggests the obvious explanation. He thought a great deal of examination in the railway service could be effected by those who were not necessarily practising oculists, but who had some ophthalmic knowledge, but the control of the work should be in the hands of an expert.

BLINDNESS IN VICTORIA.

BY

JAMES J. FENTON, Government Statist of Victoria.

(Based on Asylum Returns.)

By the courtesy of the Superintendent of the Victorian Institution for the Blind, particulars were furnished which enabled me to complete the tables of statistics embodied in the Appendix hereto in respect of all inmates, or rather all blind persons under the supervision, of the institution on 30th June, 1901. These records will form a useful supplement to the information respecting the whole of the blind persons in the State, which will be duly published, but in less detail, when the Census returns of Infirmity for 1901 shall have been compiled. The Returns now presented show several facts, which cannot be ascertained from the Census returns, such as the causes of blindness, duration of infirmity and the time of life when acquired, and the period elapsed before a blind person is admitted into an asylum.

CAUSES OF BLINDNESS.

Table I. in the Appendix shows the proximate causes of blindness in conjunction with the age at which the infirmity was acquired. Of 81 cases specified out of a total of 93, only 15 per cent. were congenital, whilst over a third arose from various diseases of the eye (chiefly ophthalmia), and an almost equal proportion from accident, nearly 14 per cent. from epidemic diseases (chiefly typhoid fever), and nearly 4 per cent. from all other diseases (brain fever or teething), as will be seen from the following summary:—

Causes.	Number.	Per cent.
Congenital Cases	12	15
Diseases of Eye	28	34
Epidemic Diseases	11	14
Other Diseases—Brain Fever	2	4
,, Teething	1	
,, Accident	27	33
Total specified	81	100
Unspecified	12	
	93	

DISEASES OF THE EYE.

Of the 28 cases of diseases of the eye which resulted in blindness, 16 involved the conjunctiva, 5 the cornea, 2 the iris, 4 the optic nerve, besides 1

other, which was unspecified. The following is a summary of the ages when blindness occurred in such cases:—

Age when Blindness was Caused by Diseases of the Eye.

Under 1 year	7
1-3	3
5-10	5
10-15	2
15-20	2
20-25	3
25-30	1
Specified ages...	23
Age Unspecified	5
Total	28

It will be seen that the critical ages are under 3 years—especially under 12 months—and between 5 and 10; while cases occurred between the ages of 10 and 30. Undoubtedly most of these cases of blindness could, with ordinary care and cleanliness, have been avoided.

Other (General) Diseases.

Most of the cases under this head occurred after the attack of diseases of a febrile character. The ages at which blindness is most apt to occur in such cases are between 4 and 8 and between 9 and 20. The latter were mostly cases of typhoid fever. The following are the numbers at the various age-groups, all but one being specified:—

Ages when Blindness Supervened on General Diseases of a Febrile Nature.

Under 1 year	2
4 to 8	5
9-15	4
15-20	2
Specified ages...	13
Unspecified age	1
Total	14

Accidents.

Blindness was the result of accident in only 2 cases under 1 year, but in as many as 14 between the ages of 2 and 8, in 8 cases between 9 and 20, and 2 between 25 and 35.

Of the 27 accidents which resulted in total blindness, the nature of 7 was not stated, but of the others, 3 were due to stone-throwing (two of the victims being very young children), 3 resulted from blows, and 2 from falls, 1 (a child between 5 and 10), from the kick of a horse, 2 from cuts with a knife, 1 from burns, 2 (of youths) from gunshot wounds, 4 (2 of whom were under 10 years) from various explosions, and 2 (both young female children) from sunstroke. The number of similar accidents which resulted in partial blindness is unknown, but it must have been much larger than that given for cases resulting in total blindness.

The following are the particulars of the accidents resulting in total blindness:—

Nature of Accident.	Age at which Accident occurred.									Total.		
	Under 1.	1-5		5-10.	10-15.		15-20.	25-30.	Not Stated.			
	F.	M.	F.	M.	M.	F.	M.	F.	M.	M.	F.	Total.
Stone-throwing	1	...	1	...	...	...	1	...	...	1	2	3
Blows	...	...	...	1	...	...	1	1	...	2	1	3
Falls	...	...	1	...	...	1	...	...	...	...	2	2
Kick of horse	...	...	...	1	...	...	...	...	...	1	...	1
Knife.....................	...	1	...	1	...	...	...	...	...	2	...	2
Fire burns	...	...	...	...	1	...	...	...	...	1	...	1
Gunshot	...	...	...	...	...	...	2	...	...	2	...	2
Explosion of—												
Gunpowder	...	...	1	...	...	...	...	...	...	...	1	1
Dynamite	...	...	...	...	...	1	...	...	...	...	1	1
Dynamite cap	...	...	..	1	...	...	...	...	...	1	...	1
Bottle	...	...	...	...	1	...	...	...	...	1	...	1
Sunstroke...............	...	...	2	...	...	...	...	...	...	...	2	2
Unspecified	...	...	2	4	...	...	...	...	1	5	2	7
Total	1	1	7	8	2	2	4	1	1	16	11	27

Sex.

In the cases of blindness arising from congenital causes and from "Other diseases," no great disparity is noticeable in the numbers of the sexes; but in cases arising from accident there were 10 males to every 7 females; and in those from diseases of the eye, as high a proportion as 5 males to every 2 females.

Present Ages of Inmates and Period of Blindness.

Of the 93 inmates of the Asylum, only 5 are less than 10 years of age, 40 (or nearly half) are between 10 and 20, 20 between 20 and 35, 20 between 35 and 45, and only 8 were upwards of 45 years. The inmates on the average have suffered from their infirmities for a period of nearly 19 years. The following are the particulars for each sex and age-period:—

Present Age.	Number of Inmates.			Average Duration of Infirmity in Years.
	Males.	Females.	Total.	
5-10	4	1	5	3
10-15	14	4	18	7
15-20	11	11	22	12½
20-25	5	1	6	19
25-30	5	2	7	16½
30-35	3	4	7	21
35-40	4	5	9	22⅓
40-45	7	4	11	37
45-50	2	4	6	22
50 and over...............	1	1	2	36
Total	56	37	93	18·8

Delay before Admission to an Asylum.

From Table III. in the Appendix a calculation has been made which shows that, although the present inmates have, on the average, been blind for nearly 19 years. only $11\frac{1}{2}$ years have been spent in the Asylum. Hence, it took $7\frac{1}{2}$ years on the average for a blind person to gain admittance to the Asylum; in the case of males it took $7\frac{1}{4}$ years, and in the case of females 8 years, as will be seen by the following results:—

	Males.	Females.	Both Sexes.
Duration of Infirmity—years	$16\frac{1}{4}$	23	18·8
Period in Institution—years	9	15	11·4
Time elapsed before admission	$7\frac{1}{4}$	8	7·4

Present Occupations.

As a rule, the inmates are not proficient at a trade until after the age of 25—there being only one under that age who was so occupied, viz., at mat-making. Of 22 males and 20 females in the Asylum over the age of 25, only 1 male, but as many as 7 females, were apparently unoccupied. Of the males occupied, 13 made baskets, 3 mats, 3 brushes, whilst 1 was a school teacher and 1 a messenger. Of the females, 8 made brushes, 4 mats, whilst 1 was a teacher of the piano.

Blindness Acquired in Adult Life.

Of persons who became blind after reaching the age of 15 years, 12 were males and 5 females, 8 (7 males and 1 female) were between the ages of 15 and 20, 4 (2 males and 2 females) between 20 and 25, 2 (1 of each sex) between 25 and 30, 2 (1 of each sex) between 30 and 35, and 1 (a male) was aged 40 when the calamity occurred. The occupations of 3 were miners, and 3 were farmers or gardeners. The following are the particulars:—

Age, Occupation, and Cause of Blindness of Persons Becoming Blind After the Age of Fifteen Years.

Cause of Infirmity.	Sex.	Age when Infirmity was acquired.	Former Occupation.
Ophthalmia	M.	18	Miner
"	M.	22	Nil
"	F.	16	Teacher
Corneal Ulcer	F.	20	Not stated
Iritis	M.	23	Farmer
Paralysis of Optic	M.	25	Gardener
Typhoid Fever	M.	16	Nil
" "	M.	18	Apprentice
Accident	M.	17	Not known
"	M.	17	Plumber
"	M.	18	Farmer
"	M.	15-20	?
"	F.	25	Married woman
"	F.	34	Not stated
Unknown	M.	34	Miner
"	M.	40	"
"	F.	20	Nil

Birthplace.

Of the 93 inmates, 79 (or 85 per cent.) were born in Victoria, 5 in the neighbouring States or New Zealand, 6 in England and 1 in Ireland (all 7 being over 40 years of age), 1 was born at sea, and of 1 the birthplace was not specified.

Heredity.

From the statistics available, it would appear that blindness does not run in families to any marked degree, for out of 12 congenital cases, there was only 1 with 1 other case in the same family, and 1 with 3 other cases; whilst among cases resulting from all other causes, only 1 (who acquired the infirmity through accident) had another case in the same family.

Appendix.

Statistics of Blindness derived from Returns of all Blind Persons in or under the supervision of the Victorian Institution for the Blind on 30th June, 1901.

I.—Proximate Cause of Blindness, and Age at which Infirmity was Acquired.

Proximate Cause.	Age at which Infirmity was acquired. Un-stated.		From Birth.		Under 1 year.		1-2		2-3		3-4		4-5		5-6		6-7		7-8		8-9		9-10		10-15		15-20		20-25		25-30		30-35		40 & over.		Total.		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Both Sexes.
I. Congenital Cases	..	..	5	5	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6	6	12
II. Diseases of the Eye:—																																					
Ophthalmia	2	..	1	..	4	1	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	8	4	12
Trachoma	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	1	..	1	..	..	..	..	..	..	..	3	1	4
Opacity of Cornea	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	2
Ulcer of Cornea	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1	1	2
Destruction of Cornea	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..	1
Iritis	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	2	..	2
Optic Neuritis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
Paralysis of Optic Nerve	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	1	2
Atrophy ,, ,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
Disease of Optic	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
III. Other Diseases:—																																					
Measles	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	1	1	2
Influenza	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	1	2
Cold	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	2
Typhoid Fever	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	2	2	..	..	..	..	..	..	..	..	..	2	3	5
Brain	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	2
Teething	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
IV. Accidents	1	..	..	1	..	1	..	..	..	2	1	1	..	2	2	1	3	..	2	..	..	..	1	..	2	1	4	..	..	..	..	1	..	1	..	..	16	11	27
V. Unstated	1	1	..	..	..	..	..	..	..	..	..	..	..	1	..	..	2	..	..	..	..	1	..	..	2	1	..	..	..	1	..	..	1	..	1	..	7	5	12
Total	7	2	7	7	5	2	..	2	1	2	2	1	1	3	4	1	5	2	6	1	..	1	1	2	*5	†6	‡7	1	2	2	1	1	1	1	1	..	56	37	95

Note.—In three instances there was one other member of the family blind, and in one instance there were three others in the family blind. This includes both sexes. One male stated to be only partially blind is not included in this Table.

* Three aged 12, and two 14. † Three aged 10, 11, and 12 respectively, and three 14. ‡ All under 19.

II.—Present Age, and Age at which Infirmity was Acquired.

Present Age.	Age at which Infirmity was acquired.																																				Total.		
	Un-stated.		At Birth.		Under 1 year.		1.		2.		3.		4.		5.		6.		7.		8.		9.		10-15.		15-20.		20-25.		25-30.		30-35.		40 and over.		M.	F.	Both Sexes.
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.			
5-10	1	..	..	1	..	..	..	..	..	..	..	..	..	..	1	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	1	5
10-15	1	1	..	1	3	..	.	..	1	..	1	..	..	1	1	..	..	..	5	..	..	..	1	..	1	1	..	..	..	..	..	..	..	..	..	..	14	4	18
15-20	2	1	2	2	1	..	..	..	..	1	..	1	1	1	2	..	..	1	..	1	..	..	..	2	2	1	1	..	..	..	..	..	..	..	..	.	11	11	22
20-25	1	..	1	..	1	..	..	1	..	..	..	..		..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	1	6
25-30	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..		..	..	..	4	..	..	..	..	..	..	..	..	.	5	2	7
30-35	..	..	1	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	1	2	..	..	..	..	1	..	..	..	..	..	3	4	7
35-40	1	..	..	1	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	1	1	..	..	..	..		1	..	..	4	5	9
40-45	1	..	3	..	..	1	..	1	..	..	..	..	..	..	..	..	1	1	..	..	..	1	..	..	..	..	1	..	1	..	..	..	..	..	..	..	7	4	11
45-50	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	2	..	1	..	..	1	..	2	4	6
50-55	..	..	..	1	..	..	..	..	..	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
60 and over	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	.	..	1	..	1
Total	7	2	7	7	5	2	..	2	1	2	2	1	1	3	4	1	5	2	6	1	..	1	1	2	5	6	7	1	2	2	1	1	1	1	1	..	56	37	93

III.—Return showing Length of Time in Institution and Duration of Infirmity.

How long in Institution.	Duration of Infirmity. Un-stated.		1-2.		3-4.		4-5.		5-6.		6-7.		7 8.		8-9.		9-10.		10-15.		15-20.		20-25.		25-30.		30-35.		35-40.		40 and over.		Total.		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Both Sexes.
Under 6 months	...	...	2	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	3	2	5
6 to 12 ,,	1	1	...	1	...	...	...	...	1	...	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	2	6
1 year	1	...	...	...	1	...	1	...	...	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	1	5
2 years	...	1	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...	...	..	...	...	...	...	...	...	3	2	5
3 ,, ...	1	...	...	...	1	...	1	...	...	...	1	...	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	6	...	6
4 ,, ...	1	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	3	...	1	...	...	...	...	...	...	1	...	...	...	...	6	2	8
5 ,, ...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	2	2	4
6 ,, ...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	2	...	2
7 ,, ...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	2	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	5	1	6
8 ,, ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1
9 ,, ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	1	1	...	...	...	...	...	...	...	...	...	...	2	2	4
10 to 15 years...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	1	2	2	...	1	...	...	...	...	1	...	...	...	6	4	10
15 to 20 ,, ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	2	2	...	4	...	...	1	1	...	...	4	8	12
20 to 25 ,, ...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	1	...	...	...	1	1	4	5
25 to 30 ,, ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	1	...	...	...	...	4	1	5
30 to 35 ,, ...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	2	2	2	2	5	7
35 to 40 ,, ...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	1
Unstated	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	1
Total......	8	3	2	1	2	...	3	...	2	1	3	2	2	1	2	..	3	1	10	4	6	4	3	4	3	6	2	4	2	3	3	3	56	37	93

IV.—Occupations and Ages of the Inmates of the Institution for the Blind.

Occupation.	Present Age.																					Total.		
	5-10.		10-15.		15-20.		20-25.		25-30.		30-35		35-40.		40-45.		45-50.		50-55.		60 & over.			
	M.	F	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Both sexes.
Pupil	4	1	14	4	10	11	5	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	33	18	51
Basketmaker	...	...	...	...	...	...	...	...	3	...	2	...	1	...	5	...	1	...	...	...	1	...	13	...	13
Matmaker	...	...	...	...	1	...	...	...	1	1	1	1	...	1	...	1	1	...	...	...	...	...	4	4	8
Brushmaker	..	...	..	...	...	...	..	...	...	...	...	3	1	1	2	2	...	2	...	...	...	...	3	8	11
Messenger	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1	...	1
School Teacher	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1
Teacher of Piano	...	...	...	...	...	...	...	...	...	...	...	...	..	1	...	...	...	...	...	...	...	...	...	1	1
Unstated (probably incapable)	...	...	...	...	...	...	...	...	...	...	...	...	1	2	...	1	...	2	...	1	...	...	1	6	7
	4	1	14	4	11	11	5	1	5	2	3	4	4	5	7	4	2	4	...	1	1	...	56	37	9

V.—Birth-places and Ages of Inmates of the Institution for the Blind.

Birthplaces.	Present Age of Inmates.																					Total.		
	5-10.		10-15.		15-20.		20-25.		25-30.		30-35.		35-40.		40-45.		45-50.		50-55.		60 & over.			
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F	M.	F.	M.	F.	Both sexes.
Victoria	4	1	12	4	10	11	5	1	5	2	1	4	4	4	4	4	...	2	...	1	...	...	45	34	79
New South Wales	...	...	1	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...	..	...	...	...	1	...	1
Tasmania	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1
New Zealand	...	...	...	...	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	2	...	2
Australia	...	...	...	...	...	...	...	..	...	..	...	...	...	...	1	...	...	...	...	...	...	...	1	...	1
England	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	1	...	...	1	..	5	1	6
Ireland	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	1
At Sea	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	1
Unknown	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1	1
	4	1	14	4	11	11	5	1	5	2	3	4	4	5	7	4	2	4	...	1	1	...	56	37	93

MIDWIFERY AND GYNÆCOLOGY.

Presidential Address.

THE PROGRESS OF GYNÆCOLOGY SINCE THE FIRST INTER-STATE MEDICAL CONGRESS, AND THE RELATION OF GYNÆCOLOGY TO GENERAL SURGERY.

BY

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My first duty is to gratefully acknowledge the high distinction which members have conferred upon me by my election to the Presidency of the Section of Obstetrics and Gynæcology at this, the sixth Intercolonial, or, as it is now, Australasian Medical Congress.

No one more clearly recognises than myself how imperfectly I must appear to fill a position which has recently been adorned by that patient hero and true scientist, the late Dr. Way, of Adelaide, and by my learned and eloquent fellow-countryman, Dr. O'Sullivan, of Melbourne. I can only hope you will remember that "to have meant well, tried a little, and failed much" is as high an enconium as can truthfully be spoken of the majority of mortals.

Custom has ordained that discussion shall not follow a Presidential Address, and therefore it is good taste for the matter of such address to be as little controversial as possible. This necessarily limits one's choice of a subject, and entails an increasing difficulty for each successive President.

In thinking over the question, it appeared to me that as this, the sixth Congress, completes the round of the various capitals of Australasia, one might with propriety and advantage glance over some of the advances in obstetrics and gynæcology which have taken place since the first Congress at Adelaide, sixteen years ago.

I do not intend to weary your patience by making it in any sense an exhaustive review, but shall merely touch upon those points which have most impressed myself.

First: as regards obstetrics. Perhaps the greatest advance is the perfecting the technique of Cæsarian section, and the firm establishment of this operation as the proper procedure in all cases in which a living child exists in utero, and cannot be delivered alive through the natural passages. I would here state my belief that where there is *permanent* and insuperable obstruction, instead of excising portions of the fallopian tubes in order to sterilise the patient, it is wiser to do a supra-vaginal amputation of the uterus, leaving the ovaries. By this means future pregnancies are prevented with absolute certainty, which cannot be said when even the entire length of both tubes are exsected. A case in proof of this statement I have myself seen. The operation can be performed more quickly and more safely, for the patient is spared all the immediate dangers of the puerperium and the more remote dangers of intestinal obstruction and rupture of the uterus, should another pregnancy occur. Finally, the operation—if Porro's method be adopted—can be approached with more confidence by country practitioners, who may possibly have but a limited experience in abdominal surgery, and no skilled assistant.

The rapid removal of the child, a piece of rubber tubing tightly encircling the cervix, two knitting-needles placed above the rubber tubing to prevent slipping, the amputation of uterus above the needles, which fix

the pedicle outside the wound, constitute a procedure, first described by Tait, not in any way difficult, and giving the patient a fair chance.

It is of course understood that, except under the abovementioned circumstances, the modern supravaginal amputation of the uterus and retroperitoneal treatment of the stump is infinitely to be preferred to the older Porro's method.

Craniotomy on the living fœtus, except in very unusual conditions, is now universally condemned.

I remember in the handbook of midwifery which I read as a student—I think it was by Lloyd-Roberts, of Manchester—there occurred a passage which more accurately translates medical opinion of to-day than it did that of 1878: "The man who would plunge a perforator into the head of an unborn babe would not hesitate, under the cloak of night, to use the dagger of the assassin."

Symphysiotomy, after a vigorous resuscitation, appears to be again receding in favor; and deservedly so, in my opinion.

The next great advance is, I think, the recognition of the immense value of abdominal palpitation in obstetrics. There is nothing which will give greater satisfaction and bring more credit to the practitioner than knowledge of this subject. By it he can ascertain the presence of twins, the position of the fœtus, the progress of labour, malpresentations of the head—such as occipito-posterior, or brow—and thus he is able to avoid useless and injurious attempts to deliver with forceps before the position has been rectified. Finally, all this information, and more, can be obtained without subjecting the patient to the slightest risk, which cannot be said of examination per vaginam.

Since the first Congress the teaching regarding the conduct of third-stage labour has been greatly altered. I say "teaching" advisedly, for I am inclined to think the *practice* of a large proportion of the profession in this matter is not in accord with the teaching of the chief schools, and most modern textbooks.

In looking over my notes of consultations in cases of puerperal sepsis I find that in nearly half these cases there is a history of "some trouble in getting away the placenta," and perhaps "a little hæmorrhage," and the conclusion I have come to is that there is no one factor connected with the management of puerperal cases so potent for evil, so productive of death and invalidism, as the forcible and early expression or extraction of the placenta.

I am often asked, "How long do you wait before expelling the placenta?" and I answer, "There is no fixed time." So long as the placenta is still in the uterus, and there is no hæmorrhage, one should patiently wait, keeping the hand on the fundus to detect uterine contraction and the movement of the placenta into the vagina, which elevates and makes more movable the upper uterine segment. I have upon one occasion waited one hour and three-quarters, and was then rewarded by the placenta coming away with scarcely any loss of blood.

If I might venture to give a word of counsel to those about to engage in midwifery practice it would be this: Do not hurry the third stage, and you will avoid much worry, loss of time and loss of credit.

Another matter about which we have altered our ideas is the routine use of the douche before and after labour. We know now that douching is not necessary; that the antiseptic does not remain sufficiently long in contact with the pathogenic organisms which may be present to kill them; that it may be the means of carrying infection into the uterine cavity; that it may re-open healed wounds, and thus aid absorption; and that, finally, it may interfere with the beneficent bacteria, whose action is to render the vaginal secretion acid, and thus kill the pathogenic organisms, which require an alkaline medium for their development. These remarks

refer to normal cases. The douche vaginal and intrauterine is a valuable aid in the treatment of septic conditions, but it must then be regarded as an *operation*, preceded by thorough disinfection of the external genitals, and carried out by the medical attendant himself.

Finally, our knowledge of ectopic gestation has immensely improved. At the second, or Melbourne, Congress, operations for this condition were so rare that some of us brought forward one or two successful operations as if we were entitled to no end of credit; now such cases are of almost weekly occurence in the chief hospitals of Australia.

In the diagnosis I have come to attach great importance to a steady drain of dark venous blood, continuing for many days—in some instances—as suggestive of ectopic gestation, and as distinguishing it, to some extent, from uterine abortion, where the hæmorrhage is brighter, and more in gushes, or clotted. In the very acute cases no tumour is to be felt—merely a boggy, tender fulness in the vaginal vault. This is not clearly stated in some textbooks, and is a matter of great importance.

As a means of clearing up the diagnosis in doubtful cases I should like to call attention to vaginal cœliotomy. It is practically free from danger, and therefore no harm will have been done should our suspicions prove to be unfounded; while if vascular adhesions be present, as is not infrequently the case, the opening can be used for gauze drainage.

In the domain of gynæcology no change is so striking as the modern view regarding the treatment of uterine myomata, and the immense improvement in the technique of hysterectomy.

Sixteen years ago such cases were generally left until the health had been seriously undermined, and the patient's sufferings were such as to induce her to beseech operation. Koeberle's serre noed held the field as the method which gave the lowest rate of mortality, but it could not be used in what Lawson Tait called "the terrible cases"—those in which there was extensive downward burrowing beneath the pelvic peritoneum. That is, it was inapplicable to the cases which most imperatively needed operation, and when it could be applied there was a mass as large as a man's wrist, or even his leg, held outside the parietes by steel pins, and strangulated by wire. The after-treatment was necessarily most trying to patient and surgeon. I, like many others, relinquished this method, because of these drawbacks, and for several years tried the combined method of pan hysterectomy, loosening the cervix and tying the uterines per vaginam, and then separating the remaining connections by abdominal section. I had considerable success by this operation, but it was always a trying one, and gave me much anxiety. One day I was fortunate enough to meet Professor Watson, of Adelaide, and he was generous enough to give me the result of his observations and experiments. Since then "terrible cases" no longer exist. Cervical development and subperitoneal burrowing can be dealt with almost as easily as the pear-shaped tumour by following the principles Professor Watson has so clearly laid down in his contributions to the *Australasian Medical Gazette*.

It has been asserted that Professor Watson's method is Howard Kelly's, with slightly different details, but I think it will be granted that details constitute much of the art of surgery, and I claim that in his method of attack (opening up a rhomboid-shaped space in the anterior blade of each broad ligament as a *first* step) Professor Watson has given us a detail of such importance as to warrant us in applying his name to the operation. Napoleon's method of attack gave him the victory over his rivals, and increased his power to destroy; Professor Watson's method of attack gives it an advantage over rival methods, and increases our power to save.

Quite recently I have been told by patients suffering from myomata that their medical attendants advised them against operation on the ground

that the mortality rate was terribly high. I trust these gentlemen will make themselves familiar with modern writings, or make a point of seeing for themselves the results of the modern operation. I have had, myself, a series of twenty-five consecutive recoveries, and then unfortunately had a death from sepsis in an unfavorable environment. Since this death I have had another series of fifteen consecutive hystero-myomectomies without a death to date, and the number would be nineteen if I were to include three other cases in which I amputated the uterus to facilitate the enucleation of intraligamentary cysts, or because it was forming part of an abscess sac.

A mortality rate of one in forty-three cannot be considered high, and as other operators have had even better results, it must be allowed that hystero-myomectomy is infinitely safer than the operations for chronic inflammatory disease of the appendages, which are undertaken by the average surgeon with a light heart.

Trendelenburg's position was not known sixteen years ago. Dr. Florian Krug, of New York, sent me his frame for obtaining this position thirteen years ago, and I think this was the first apparatus of the kind in Australia. I regard the position as of great value, and as being an immense aid to pelvic surgery. It enables all the procedures to be carried out under the guidance of the eye, and thus greatly lessens the danger of injuring important structures, while, in conjunction with the reflecting retractors which I use, the most minute oozing point can be detected and dealt with.

The reversed Trendelenburg, that is, the pelvis dropped 5 inches below the horizontal, is also worth much in certain cases, *e.g.*, where flushing is determined upon. By its use, contamination of the general peritoneal cavity can be avoided in pus cases, and in ectopic gestation the saline solution can be made to carry blood and clot down into the pelvis and out at the lower angle of the wound.

The abandonment of the pedicle in ovariotomy and removal of the appendages, and the substitution for it of separate ligation of the vessels at the inner and outer end of the utero-ovarian vascular arch, has been of striking value in lessening suffering and lowering the mortality rate of pelvic surgery. The late Dr. Way was the first, I believe, in Australia to alter the technique in this way, and that considerably before Kelly's book came out. I owe a knowledge of it myself to Professor Watson.

The next great step in progress which I have to chronicle is "the passing" of the pessary. When I was at the Melbourne Congress a gentleman was good enough to show me a large cabinet which he had had made solely for various kinds of pessaries. One might paraphrase Hans Breitmann and exclaim, "Where are those pessaries now?"

No one who has given any thought to modern researches in the bacteriology of the vagina can fail to perceive how potent a factor for evil a pessary must be. The ordinary bacteria of the vagina are beneficent, but under favorable circumstances, and in suitable pabulum, quickly become pathogenic. There is no better culture medium for organisms than the vaginal secretion, which, by being dammed back around the bar of the pessary, has undergone decomposition.

The pessary, then, strongly favours sepsis and the endometritis and salpingitis, which are its products. If medical men would only reflect on these facts they would be slow to adopt a mode of treatment so certain to prove mischievous. "Do nothing, rather than do anything wrong," is a rule which might with advantage be more frequently observed.

Unfortunately, even the next English textbooks still figure pessaries and teach their use, and one has regretfully to look away from the Old Country for teaching in gynæcology in accord with recent scientific advances.

For my own part, I have abandoned the use of pessaries, except for a week or two in cases of retroversion of the gravid uterus, and in old women whose tissues are too atrophied to make operation of value.

For mobile backward displacement of the uterus, Australian gynæcologists are generally agreed that Alexander's operation is the best treatment to adopt.

I learnt the operation from its originator, Dr. Wm. Alexander, of Liverpool, and introduced it into New South Wales seventeen years ago.

Resorted to both here and all over the world in unsuitable cases, and by men who were not familiar with the proper technique, it soon fell into disfavour, only to be again revived and established as, on the whole, the best means of giving relief in a very common and important lesion.

When the uterus is fixed—in other words, when salpingitis is associated with the retro-displacement—Alexander's operation is now held to be contra-indicated, unless it is preceded by opening Douglas's pouch and separating the adhesions. In such conditions, however, the more generally accepted plan is to do abdominal section and ventro-suspension of the uterus. The dangers during pregnancy and labour of too firm a fixation are now well known, and avoided by taking up but a small area of the fundus uteri and uniting it to peritoneum and sub-peritoneal tissue only.

Procidentia uteri, up to a few years ago, was the opprobium of gynæcology. All sorts of operations were devised for its cure, and many surgeons exercised their ingenuity in planning differently-shaped denudations of the vagina; until finally it was proposed that the ante and post vaginal walls should be united, so that a bar might be formed, upon which the uterus might rest. The vagina was, in fact, obliterated.

The cause of failure lay in the non-recognition of the multiple causes which were at work in producing this condition, and that, as there was not one lesion, but several, unless all were remedied, and at the same time, a relapse was fairly certain to occur.

Here again Alexander's operation has proved of great service, for, unless the posterior surface of the uterus received the force of intra-abdominal pressure, although we might have diminished the size of the uterus by curettage and resection of the cervix, and strengthened the vaginal walls by ante and post kolporrhaphy and perineorrhaphy, the retrodisplaced uterus gradually sagged down and destroyed the effect of our efforts.

In the operation as now practised by myself and others, all these various procedures, with the addition of Alexander's operation, are performed at the same sitting. We call it at the Sydney Hospital "the altogether."

The results are excellent. Indeed, I know of nothing which gives more satisfaction to both surgeon and patient than this treatment of procidentia, and the gratification is all the more in that the method does not involve risk to life. Of course, in old women, when the tissues are atrophied from senile changes and pressure atrophy, operation is not indicated. I find wool tampons the best palliative treatment under these circumstances.

I cannot refrain from again referring to vaginal cœlitomy. Apart from its value in diagnosis, to which I have already alluded, it is, in my opinion, a real life-saving measure in pus cases: *e.g.*, a woman is desperately ill with pelvic suppuration, an incision is made into Douglas's pouch, and a large quantity of encapsuled pus evacuated. If pus sacs are detected they are punctured with a sharp scissors or finger, and emptied also, and a rubber drainage tube stitched in the opening. In a week or two the general condition has immensely improved, permitting the removal of the diseased structures by abdominal section with comparatively slight risk.

Again, there may be no encapsuled pus in Douglas's pouch, and no constitutional disturbance, but one or two large pus sacs are detected on bimanual examination. The pouch is opened, the pus withdrawn from

below, and the cavities disinfected, so that at the abdominal section, *immediately* performed, all danger of fouling the general cavity of the peritoneum is avoided. For the past two years, in all cases in which I have suspected pus or dense adhesions, I have as a routine procedure done a preliminary vaginal cœliotomy, and inserted a single strip of gauze into the pelvis. (To fill the pelvis with gauze is, I think, a mistake; used thus it seems to act like a cork, blocking instead of favouring drainage. A single strip is all that is required.)

The results have shown a great improvement. Last year I operated by this method in the Sydney Hospital on thirty-one cases, with one death, and that one was moribund on admission from septic peritonitis. The mortality rate prior to my adoption of this method was more than twice as great.

I am not aware that any previous writer has advocated the systematic employment of vaginal cœliotomy as a preliminary to abdominal section for suppurative disease of the uterine appendages and pelvic abscess, its product. There has been, and still is, a fierce controversy as to the relative merits of the vaginal or abdominal route in dealing with pelvic suppuration. What I urge is the employment of both in the way I have just described.

Before concluding, I think it right to say a few words upon the relation of gynæcology to general surgery. A case of general surgery comes into the consulting room of a gynæcologist, and is straight away sent on to a general surgeon, but in reversed circumstances there is, as a rule, no reciprocity. The general surgeon considers himself quite entitled to keep the gynæcological case which comes to him, and, what is more, there is a growing tendency upon the part of the general practitioner to think it is immaterial whether he sends gynæcological cases to a surgeon or specialist in gynæcology. From the patient's point of view, is it immaterial? That is the question that should be asked and answered. It must be admitted at once that the well-trained general surgeon can do much of the gynæcologist's work, but which can do it best, and with least risk to the patient?

No man, however capable, can hope to master every portion of the vast field of general surgery; it is still more impossible that he can become in addition an expert in the special branches.

Gynæcology is a wide and difficult subject, with hundreds of workers in all parts of the world. A man in a large practice finds it no easy task to keep in touch with the progress which is daily being made. If the general surgeon endeavours to do so, it can only be by neglecting much in his own sphere.

While gynæcology belonged to general surgery it was absolutely stagnant and stationary; but when, twenty years ago, it became a special branch, to which earnest men devoted their whole time and energies, progress came by leaps and bounds, and gynæcologists showed the way in liver, spleen, kidney, and intestinal surgery. It cannot be denied that not alone in gynæcology, but in every branch of science, advance has been along the lines of specialism.

I say, then, that work will be most satisfactory to both patient and doctor which is done by the man whose mind is saturated with the literature of his subject, and indented with a thousand impressions which experience has made regarding the cause, course, and complications of the disease, and the manner in which they may best be met.

If every medical man would do as he would be done by (and I am proud to think this is true of the vast majority), it would be no longer possible to occasionally say, "Dr. A. sends his relatives who are gynæcological cases to a specialist; but his private patients, suffering in the same way, to a general surgeon."

If I have in this short and imperfect address dwelt much upon the triumphs and progress of gynæcology, it is not because I do not fully recognise that there have also been failures and recessions; one has only to recall the abuse of curettage and trachelorrhaphy, the delusions regarding anterior displacements of the uterus, and the wholesale removal of ovaries but slightly diseased, to admit this. But as the incoming tide appears to ebb and flow, flow and ebb, yet ever surely and steadily gains upon the trampled sand, so our art, although its advance is sometimes checked, or even becomes converted into a retreat, yet ever presses onward to that beneficent goal, the relief of human suffering and the prolongation of human life.

That goal will be more completely attained in proportion as we have men in our profession who do not hesitate "to scorn delights, and lead laborious days," in order that they may not fail to march in the van of surgical progress.

SOME POINTS IN CONNECTION WITH THE GYNÆCOLOGICAL SURGERY OF THE ROUND AND BROAD LIGAMENTS.

BY

PROFESSOR WATSON, Adelaide.

THROUGH your courteous Secretary, Dr. Wolfhagen, Mr. President, you have invited me at a moment's notice to co-operate in the work of the Section over which you preside. However flattering this may be for me, it tends to show that the expectation of efficient support from your fellow-specialists has not been realised. The absence of so many of them from the Congress is much to be regretted.

You have suggested that I should pass in review a few points in anatomy which bear on gynæcological operations. As the proof of an operation lies in its success, my remarks will probably not affect established routine technique, for as long as gynæcologists attain their wished-for results, it can be but a matter of indifference what anyone outside the pale of their speciality may think of their operations.

What does the Arctic whaler, who navigates his wooden tub in and out of all sorts of impossible corners, care about the opinions of the land-lubber who devotes his time to observing the sun and stars from a safe hill-top? The sailor feels that, notwithstanding the knowledge of heavenly bodies possessed by the landsman, the latter, were he called upon to navigate the ship, would inevitably come to grief in the ice floes.

Those who made epochs in gynæcology were not pure anatomists, but bold pioneers who literally sailed into the unknown and came out on top, like Columbus did when he discovered America. There would never have been any ovarian pedicles to wrangle about, had they been anatomists, and the question of intra or extra peritoneal treatment of stump or of clamp *versus* ligature would hardly have arisen. At the dawn of the twentieth century their successors would not still advocate ligature *en masse*, and much less the pernicious practice of interlocking the same.

I will endeavour to limit my further remarks to the round ligaments, but will refer to the broad ligaments in so far as they are correlated with the former in the technique of operations within the pelvis.

The round ligaments, as you know, are ontogenetically connected with the uterus, which they connect with parts outside the pelvis, and therefore consist of an internal or pelvic and an external or inguino-pubic portion, which latter is more or less split up into fasciculi. The contact relations of the round ligaments with the peritoneum and the immediate neighbourhood of their pelvic portion to the large vessels which supply the pelvic viscera are points worthy of consideration. Their intrinsic vascular supply and the occasional neoplasmata which develop in them also merit recognition.

Touching their connections with the peritoneum, for instance, in the operation of shortening the round ligaments, whether the inguinal canal is laid open or not, adherent peritoneum is drawn down in either case, as a traction-diverticulum—which is milked back to the internal ring in the former, and abandoned as a sort of artificial canal of Nuck in the latter procedure. A friend of mine, who has operated hundreds of times by the open method, and whose skill is proverbial, repudiates the gentle indictment that his outermost suture sometimes traverses peritoneal membrane. I am convinced that in a dead body, when ascites is present, a drop trickles through in the neighbourhood of the internal ring when the ligament is drawn upon to the same extent as it is in an operation on the living.

In an ordinary inguinal hernia in the female the round ligament is accompanied by a pouch of peritoneum, and both are invested by the so-called transversalis fascia. In operating for the radical cure of hernia, all three elements are usually included in the ligature which closes the neck of the sac. It would be better to open the sac and draw on the ligament till the transversalis fascia parted company with it, and then suture the neck, without including the round ligament, which, when let go, would retract as the uterus fell back, and carry the sutured area into the iliac fossa, out of harm's way, and away from the internal ring (external inguinal fossa). I have seen a first-class operator resort to ventri-suspension, after vainly endeavouring to isolate a round ligament rendered impregnable by a previous operation for the radical cure of hernia. Of course, in such a case, the first operator, had he been a gynæcologist, would have shortened the ligament at the same time that he cured the hernia.

If steady traction is maintained on the round ligament, even when there is no accompanying hernia, provided the ligament does not break, the tube, and then the ovary, will appear in the breach, and occasionally the bladder will intrude itself as well.

We too often overlook the connection of the blood-vessels of the round ligament with the deep circumflex iliac vessels, and forget that the rivulet of blood which flows from the external ring in the operation of shortening the ligaments with unopened canal is due to rupture of those connections. The pool of blood which appears in the depths of the outer angle of the wound when the canal is opened, necessitating so much swabbing, is also due to the same cause.

The artery to the round ligament arises from the ovarian branch of the uterine (otherwise uterine branch of the ovarian), a long way away from the uterine cornu, and has therefore to return to the side of the uterus to engage itself in the round ligament, which it follows out of the pelvis. It is often cut in this transitional portion of its course, and intrudes itself as a "spurter," invariably taking the operator unawares.

Of primary importance is the use that may be made of the round ligament as a landmark for locating the vascular supply of the uterus and adnexa, which must be secured, or at an rate located, in so many operations, on the pelvic viscera. Whatever may be adduced as to the causes of failure in finding the round ligaments outside the abdomen, when once the abdomen is opened, the ligament is hard to miss, as, if, for some reason, its origin near the uterine cornu is obscured, its appearance on the sky-line of Poupart's ligament, as it leaves the abdomen at the internal ring (external inguinal fossa), is apparent to all. In abdominal hysterectomy and in removal of intraligamentous growths it (and not the infundibulo-pelvic fold) should form the first point of attack, as by cutting it across with some adjacent peritoneum the utero-ovarian vascular arch is exposed on the floor of the rhomboid space thus opened up in the broad ligament. All the veins coming from an ovarian cyst, or from the most adherent and complicated sacto-salpinx, can be garnered on the finger (introduced into the broad ligament) and secured by two ligatures, one on the pelvic side of the ovary, the other on its uterine side. Intraligamentous growths, cystic or solid, whether isolated or connected with the side of the uterus, are at once rendered accessible, sometimes without even dividing the exposed vessels (utero-ovarian arch) coursing over the surface.

If these vessels (immense veins) disappear, or are not evident on cutting the round ligament across, then they must be behind the tumour. If they remain in view, their course is necessarily in front of it, and the ureter, however much it is deflected by the growth, cannot alter its relations to the vessels, which must lie between it and the operator.

Section of the round ligament within the pelvis also affords access to the obliterated hypogastric artery, and traction on the latter draws the origin of the uterine artery away from the dangerous proximity of the iliac veins on the pelvic wall, and permits of its safe ligation in abdominal hysterectomy for cancer. Cutting the round ligament an inch and a half from the uterus obviates the necessity of groping about in the endeavour to isolate an impossible infundibulo-pelvic fold (as a step in hysterectomy, oophorectomy, &c.), more especially on the left side, where it is so often obscured, and apparently duplicated, or even triplicated, by adhesions, or merged in the meso-sigmoid. In the endeavour to secure the ovarian vessels in such a fold, the nutrition of the bowel is apt to be impaired, and a path for bacterial invasion opened up; the safety of the ureter is also imperilled, as it may be punctured, deflected from its course, or inadvertently tied.

On the right side the appendix may be inadvertently torn across, cut, or tied. No matter how distorted and adherent the tube, or how cystic and lost in adhesions the ovary may be, that one single inch of the utero-ovarian arch (veins and artery) which supply both structures can be secured inside the broad ligament, and cut free without danger to the ureter, bladder, or bowel, and the matted mass (tube and ovary) more easily removed from in front than by the usual method of digital separation of adhesions from behind, which, even if effected without rupture, still leaves the unknown quantity, the pathologically-altered infundibulo-pelvic fold, to be attacked.

By drawing the round ligament backwards over the resulting denuded area in the floor of the pelvis, the latter is covered with peritoneum borrowed from the anterior blade of the broad ligament, as the round ligament affords good holding-ground for the sutures which attach it to the posterior pelvic peritoneum.

After removal of a cyst or a tumour from between the layers of the broad ligament, the continuity of the (cut) round ligament may be re-established by suture.

Coming to the broad ligaments: it is convenient to think of their posterior surface as one would that of the scapula. The fossa above the ovary and its ligament (ovarian fossa of the English) may be compared to the supraspinatus fossa; and the fossa below the ovary and its ligament (ovarian fossa of the French) to the infraspinatus fossa. The ovary may occupy and be adherent in either fossa.

When the ovary is drawn away from the uterus, the ovarian ligament is put on the stretch; when it is drawn towards the uterus, the ovarian vessels (ovaro-pelvic or infundibulo-pelvic fold) are put on the stretch. I have seen this structure torn without the contained vessels being ruptured. Sometimes, however, the vessels have given way as well, and not been tied; yet fatal hæmorrhage did not result, as would have been the case had they been cleanly cut instead of torn.

A few of these mishaps occurred in operating by the vaginal route.

Hæmorrhage takes place from the veins as well as from the ovarian artery, as the former appear to be deficient in valves, and I have been startled by the sudden appearance of an immense varicocele above a ligature placed on these vessels during the course of abdominal hysterectomy. The application of a supplementary ligature to the infundibulo-pelvic fold leads to a thrombus of blood impounded between it and the primary ligature towards the ovary.

When operating on varicocele of the valveless ovarian veins, it is well, therefore, to snip them across, and allow the blood impounded between the ligatures to escape on a sponge.

Even if these veins were well supplied with valves, crural thrombosis from pricking them would be just as frequent as it is at present, because the blood would flow from them by way of the uterine veins into the iliacs.

Pediculisation of the blood-supply of the tube and ovary with part of the broad ligament should be abandoned, the more so if a Staffordshire knot or interlocked ligature is employed. As one loop pulls the other off, it cannot possibly hold it on.

Before finishing, I would like, as I still have a few minutes, to draw your attention to those extraordinary tumours of the round ligament which I have three times known to have been operated on as herniated ovaries. Microscopically they are adeno-myomata, and my friend Dr. Hamilton will describe a recent case of his, of which I have some microscopic sections. Presumably they are developed from congenitally-displaced rests of the Wolffian body.

In the three cases I have experience of; a patent process of peritoneum co-existed in the inguinal canal. This at times was probably occupied by bowel or omentum, &c. The lump, over which, in all three cases, a truss was worn, was adherent to the skin, and outside the sac, at the external ring. In two of the cases, even after its removal, it was at first mistaken for an ovary. In the third case (spinster, æt. thirty-two), I mistook it for a callosity developed by the intermittent pressure of a truss. The real ovary and tube were also removed at the same time, but, as in the other two, a probably similar condition appeared later on, in the opposite side. The President will have further opportunities of investigating it, as the case was under his care.

My friends, Drs. Currie and Buntine, of Ladysmith fame, operated on the second case, in the belief, like Dr. Hamilton, that they were dealing with a herniated ovary (spinster, æt. thirty). As in Dr. Hamilton's case (spinster, æt. thirty-seven), the abdomen was subsequently opened, for other reasons, and two ovaries discovered. I would always be sceptical of a tumour removed from the inguinal region being a herniated ovary if it were not accompanied by the Fallopian tube.

In the first case even the microscopical examination appears to have misled at first. In Currie and Buntine's case the tumour was sent to Guy's Hospital for microscopical examination, and a report on the same will in due course be at our disposal.

In conclusion, I must thank you sincerely, Gentlemen, for the attention you have paid me.

Discussion.

Professor Allen (Melbourne): The best guide for getting hold of round ligament at external abdominal ring is to look for it at the upper part of the internal pillar, without dividing the pillar; make sure of isolating the round ligament. The ligament has adhesions to peritoneum at the internal ring, also where the ligament crosses the internal iliac vein. These cause difficulty in making traction.

Doubling down of the fallopian tube is the rule in ninety-nine cases out of one hundred; but in one case of old tubal trouble I have seen adhesions to under-surface of liver. Varix of ovarian vessels has not been sufficiently studied. It is sometimes due to puerperal conditions. There is sometimes enormous dilatation of the veins and thrombosis; this condition occasionally occurs apart from pathological conditions of the other organs, even in non-parous women.

Dr. Rothwell Adam (Melbourne): As the second ligament emerges from external ring it splits up into numerous fasciculi, which are difficult to find. Higher up there is a more definite ligament. Breaking of the

ligament is due to getting hold of one fasciculus or more. My practice is to shorten round ligament as it emerges into canal. If the peritoneal investment is pulled upon it is apt to cause hernia, as an artificial canal is made. It is better to open the canal, and to strip the peritoneum off the round ligament.

DR. J. A. G. HAMILTON (Adelaide): Many advantages have been derived from Professor Watson's help.

Varices are very common. I have noticed them especially in unmarried girls. They cause constant pain. Have seen them when there has been no retroversion to interfere with the blood-supply. I have lately opened the abdomen, when pain alone has been complained of. This pain is always caused by varices. Relief has been attempted by tying off the varicose veins. The best procedure is to button-hole the peritoneum, pull out the veins, and tie them. Care is required, as bleeding easily takes place. In some cases it is absolutely impossible to tie the vessels. In tubercular cases, with adhesions, injury to the sigmoid is almost unavoidable.

DR. MOORE (Melbourne): I have observed the varicose condition of ovarian veins with much interest. I have frequently found the co-existence of three conditions, viz.: cystic ovary, much thickening of capsule, with entire cystic degeneration of ovarian substance, and enlargement and retroflexion of uterus. I have removed the appendages on one side, in order to afford relief, but have found that the appendages on the other side have to be removed later.

In my experience the condition has mostly been found in multiparæ, but I can recall one instance in which it occurred in a condition of long sterility. In another case I removed appendages, affected as above described, on one side, and a pregnancy followed.

The PRESIDENT: We are greatly indebted to Professor Watson and Professor Allen as anatomists. Watson's teaching has saved hundreds of lives, and has made all cases easy.

In doing the Alexander-Adam operation I do not open the canal unless the ligament has split up. If the canal is opened, the peritoneum should be carefully stripped back, in order to avoid hernia.

If a hernia has existed previously it is impossible to shorten the round ligament, as the vessels are apt to be torn.

In top-sewing the broad ligament the veins are sometimes blocked, and phlebitis ensues.

Varix prevails commonly; is often accompanied by hydrops folliculi. My practice is to extirpate centre of ovary and to puncture cysts.

PROFESSOR WATSON briefly replied.

NOTE ON A SPECIMEN OF LARGE COCCYGEAL TUMOUR IN THE FŒTUS.

BY

Reginald R. Whishaw, M.B., F.R.C.S., Hobart.

The specimen I have to show you consists of a full-term female fœtus, the subject of a large coccygeal tumour.

The confinement occurred in the practice of Dr. David Morrison, of Evandale, Tasmania, in consultation with whom I attended the case on the 9th instant.

The mother, a well-developed woman, had previously borne three normal children, and no history of deformity was obtained on either side of the family.

Labour was reported to have advanced satisfactorily for three and a half hours, when, in spite of strong pains, the expulsion of the fœtus came to a standstill, and no progress at all had been made for half an hour before my arrival. I found the patient fully anæsthetised, and the child born as far as the middle of the chest, its back being directed forward. It was deeply cyanosed, the face much swollen, and the cord pulseless.

The uterus was still large, extending to a point midway between the ensiform cartilage and the umbilicus, irregularly prominent, and contracted with a considerable degree of firmness, forming a hard mass, in which nothing definite could be discovered by palpation.

Traction on the fœtus met with obstinate resistance.

On further examination I was able to confirm Dr. Morrison's opinion that a large pedunculated coccygeal tumour was present, blocking the pelvic inlet.

The placenta was found at the posterior aspect of the fundus, while the tumour, which completely overlapped it, was situated anteriorly, extending to a high level, and projecting over the maternal pubes.

We proceeded to puncture the tumour with the view of evacuating its contents sufficiently to admit of delivery.

This was a matter of some difficulty, owing to its distance from the pelvic outlet, and the interposition of the right thigh of the fœtus. An opening was, however, made with an Oldham's perforator, and some ounces of fluid released, but the growth proved multilocular, and no appreciable diminution in its size resulted. No other part was within reach of the perforator or other instruments at hand, but prolonged efforts with an index finger were at last rewarded with the collapse of two more cysts, and the discharge of upwards of a pint of clear, straw-coloured liquid.

Delivery was then easily concluded, and the placenta (an unusually large one) removed without difficulty. There was no hæmorrhage or perineal laceration, and the patient, after recovery from anæsthesia, was found to have borne the procedure well.

The tumour, which, together with the fœtus, weighed 11 lbs., is large, irregularly rounded, and pedunculated. It consists of a congeries of tough-walled cysts, containing clear fluid and some intracystic growths. Its origin appears to have been from the anterior aspect of the coccyx, for between that structure and the rectum is a smooth-walled cyst an inch in diameter, which communicates by a sharp-edged circular opening with the uppermost of the larger loculi, of which the growth is mainly composed. The coccyx terminates in a cartilaginous "tail," to the extremity of which the growth is firmly attached.

Large Coccygeal Tumour in the Fœtus.

In a case of this kind the question whether spina bifida is present naturally arises, for though the attachment is low, there are two varieties of that condition possible.

In the one the protrusion—usually a true meningocele—may occur in any part of the sacral region, or through the deficiency normally found below the third sacral vertebra; in the other the opening of escape is originally small, and gives rise to pedunculation of the cyst, and later on the occlusion of the opening causes separation of the sac, which is ultimately found as a closed cyst within the tumour.

The former of these possibilities is set aside by the circumstance that dissection shows the development of the vertebral canal and its contents to be normal. The second, which is of extreme rarity, has not been described (so far as I can ascertain) in any multilocular growth of this sort, and may, I think, be also excluded.

It seems probable, then, that the growth originated between the rectum and coccyx in tissue which formed part of the neurenteric canal.

The photographs are by Mr. Alfred J. Taylor, Public Librarian, Hobart.

Professor Allen (Melbourne): I have seen small cystic growths, something like the stump of the tail of a sheep, filled with fat. In another case a large perineal cyst, due to a terminal spina bifida.

The President: A very rare and interesting condition. Have not seen any like it.

A PLEA FOR THE MORE FREQUENT ADMINISTRATION OF CHLOROFORM IN CONFINEMENTS.

BY

C. J. PIKE, M.B., M.R.C.S.E., Launceston.

THIS is a repetition, with extension, of a short paper read by me four years ago before the local branch of the British Medical Association, and my views have only been confirmed by my further experience.

My object in bringing this matter forward is to advocate the more frequent use of chloroform in the second stage of labour, as from my own experience there is much less injury caused when it is used, and there is the great saving of suffering which it is our object to lessen as much as possible. I have taken my statistics from 873 cases attended during the last nine years, as it is since 1894 that I have adopted more frequent administration of the drug. I may mention that I had attended over 1000 cases before the time that I date these statistics from, so I am not speaking from a novice's point of view.

Though in cases of difficult labour it is necessary to have an assistant to administer the anæsthetic, in the cases that I am now advocating it is quite possible for one person to give the chloroform and manage the delivery, and for some time past I have carried out that practice.

We are perhaps favoured in this country in having healthy mothers to deal with, as rickets, with its accompanying deformities, is unknown, and out of nearly 2000 cases, I have never had to perforate, and seldom have I had to resort to turning.

Regarding the danger that is usually attendant on the administration of the drug for my own part I believe that in cases of labour it is absolutely safe, and the danger is rather of giving too little than too much. I have never seen any of the bad symptoms of tendency to heart failure or shallowness of breathing, and in almost every case where there has been post-partum hæmorrhage, it has been when the patient was not thoroughly under the influence of the drug at the end of the second stage. Where post-partum has occurred, I put the patient under a course of treatment before the next arrival is expected, and in no case has it recurred, even though chloroform was used again. After the expulsion of the child I cease administering the drug, and allow the patient to come to, only re-administering it in cases of adherent placenta or of twins. We have, of course, in some cases of primiparæ and of abnormal presentations, to give the chloroform before the end of the first stage, but my advocation is for cases, more especially of multiparæ, when the second stage is begun, and I cannot conceive why we should not help all in our power to allay suffering, provided we cause no injury to the mother or child.

As the first stage is passed the injury we are most concerned in is to the perinæum, and so far as this is affected, my statistics are strongly in favour of chloroform. Unfortunately, I have not, in my notes of the cases, made any distinction between those primiparæ in which chloroform had to be used on account of abnormal labour, and those in which it was only used for the relief of suffering, otherwise I think the results would have shown out much more strongly in favour of the anæsthetic. The rupture is most often caused by too rapid expulsion of the fœtus before the outlet is dilated, and the chloroform not only retards the expulsion, but it also relaxes the tissues at the outlet.

Of 247 primiparæ, 149 were delivered under chloroform, 136 with forceps, and 13 without, and 98 were delivered without chloroform, 18 with forceps, and 80 without. In the former there were 20 ruptured perinæum, and in the latter 23, so that under chloroform there were 13·4 per cent. ruptured perinæum, and without it 23·5 per cent.

Taking the first five years, 69 were delivered under chloroform, with 12 ruptured perinæums, that is 17·4 per cent.; and 78 were delivered without chloroform, with 24 ruptured perinæums, or 30·7 per cent.

Taking the last five years, when I used chloroform more frequently, 102 were delivered under chloroform, with 12 ruptured perinæums, or 12 per cent.; and 29 without, with 4 ruptured perinæums, or 14·1 per cent.; or, taking the primiparæ altogether in the first five years, 147 had 36 ruptured perinæums, or 17·7 per cent.; and during the last five years, 131 primiparæ had 16 ruptured perinæums, or 12·2 per cent.; so that when chloroform was used, the percentage of ruptured perinæums was markedly less, and with the more frequent use of chloroform, the percentage of ruptures has correspondingly decreased.

When I speak of chloroform and forceps being used, my practice is to use the long forceps till the head is fairly low down, then use the short ones till the perinæum is fairly distended; then take these off, and leave nature to bring the head through the perinæum.

The attendant's time may theoretically, in some cases, be more taken up than in natural delivery, but as a matter of practice, the chloroform, by softening the muscles at the outlet, and by enabling the patient to bear down more forcibly, really, I think, tends to shorten the labour and the quicker passage of the head through the vagina by the aid of the forceps, whose use is rendered painless by the chloroform, causes less injury to the soft parts, and materially shortens the time of labour.

In multiparæ, when labour has been going on tediously for hours, how often we can, with the help of this drug, bring the labour at once to an end, and save many hours of pain and exhaustion, while, owing to this saving, the recovery is more rapid, and the patient expresses herself in a few days as never having felt so well before with any of her babies.

Under the fear of meddlesome midwifery, we are too often apt to dissuade the mothers from the use of this drug, but I think it is greatly in our power to minimise the terrors of child-bed by advocating its use much more than we are accustomed to, and administered at the proper stage of labour, I am convinced that it is innocent of all the crimes that have been attributed to it of indirectly causing (through hurrying on labour under its influence) ruptured cervix, displacements, metritis, &c., and that as long as asepsis is constantly kept in view it is perfectly safe.

Though I have increased the use of chloroform in confinements, I find that my gynæcological practice has not increased, but has decreased considerably, showing that injury to the uterus has not resulted from the use of the forceps, but this decrease must, of course, be attributed to the more careful regard of asepsis during the later years.

It will be seen that in 1893 I used chloroform in only 13 per cent. of the confinements, while during the last four years I have used it in from 49 to 68 per cent., or, not reckoning the cases where the child was born before my arrival, from 54 to 77 per cent.

I do not (though perhaps holding these convictions, I ought to) urge my patients to take it, but I never refuse them when they ask for it, and my object in reading these few notes will be accomplished if I can persuade any or all of you to use chloroform whenever you can in cases of confinement, as these facts show conclusively, to my mind, that it is not harmful, and it is our bounden duty to relieve pain whenever we possibly can.

Year.	Total Number	Under Chloroform.			Without Chloroform.			Ruptured Perinæum.		Born before arrival.	Total per cent. Chloroform.	Actual per cent. Chloroform.
		Total.	Forceps.	Without.	Total.	Forceps.	Without.	Chloroform	Without.			
1893	140	17	10	7	123	26	97	...	...	...		
Primiparea	48	4	...	4	...	12	32	...	11	...	13	...
1894	98	28	24	4	70	9	61	...	...	...		
P.M.	19	9	9	...	...	...	10	1	4	...	27	...
1895	116	46	38	8	70	13	57	...	...	...		
P. M.	27	22	22	...	...	...	5	5	2	...	40	...
1896	86	39	36	3	47	5	42	...	...	...		
P. M.	22	12	12	...	...	...	10	2	3	...	43	...
1897	97	52	51	1	45	...	...	...	...	...		
P. M.	31	22	22	...	...	...	9	4	3	...	53	...
1898	90	50	41	9	40	5	35	...	...	12		
P. M.	28	21	17	4	...	2	5	2	1	...	55	64
Post partum	7	...	6	...	...	...	1	...	...	...		
1899	76	37	33	4	39	6	33	...	...	...		
P. M.	19	12	12	...	...	1	6	2	...	8	49	54
P. P.	6	...	3	...	..	...	3	...	...	...		
1900	90	62	47	15	28	2	26	...	...	...		
P. M.	29	26	23	13	...	...	3	3	...	9	68	76
P. P.	1	...	1	...	...	...	...	...	...	...		
1901	80	54	42	12	26	4	22	...	...	...		
P. M.	24	21	19	2	...	3	1	1	...	9	67	77
P. P.	3	...	2	...	...	...	1	...	...	...		
Total	873	385	...	...	488	...	...	...	...	...	44·2	...
P. M.	247	149	...	...	98	...	...	20	23	...	60·3	...

Ruptured Perinæum, with chloroform, 13·4 per cent.; without, 23·5 per cent.
1st 5 years, ruptured Perinæum, with chloroform, 17·4 per cent; without, 30·7 per cent.
2nd 5 ,, ,, ,, ,, ,, 12 ,, ,, 14·1 ,,

Discussion.

Dr. Cowen (Eaglehawk): Do you control the administration of chloroform and attend to the patient at the same time? My experience has been that the administration of chloroform retards delivery after the eighth or tenth child. Perineal tears require careful classification; statistics about them are unsatisfactory otherwise. Has the reader's experience been that the frequency of tears has diminished by using chloroform?

Dr. Horne (Melbourne): I give chloroform in nearly all cases without exception, but carry out partial anæsthesia only. If complete anæsthesia is required I send for other assistance. Have noticed no increase in the frequency of hæmorrhage when chloroform has been given; think that hæmorrhage is more likely to follow on prolonged exertion of the uterus. The risk of death from chloroform is much diminished during labour, as patients are anxious to take it, and do not struggle. As a rule, I do not use forceps in first cases without grave cause. Trans-multiparæ forceps can be applied without an anæsthetic if pains slacken.

Dr. J. A. G. Hamilton (Adelaide): I do not agree with complete anæsthesia during expulsive efforts. Changing forceps is hardly desirable; it is better to keep on forceps until delivery is completed. If forceps with proper curve are used there is less risk of injuring perinæum.

The President: Distinction should be drawn between partial and complete anæthesia. Hæmorrhage is favoured by chloroform, as it leaves prolonged inertia immediately after delivery of child.

Dr. Pike replied.

PELVIC SUPPURATION.

BY

G. ROTHWELL ADAM, M.D.,

Lecturer on Obstetrics and Gynæcology; Hon. Surgeon, Women's Hospital, Melbourne.

IN bringing before your notice the subject of pelvic suppuration, I am quite conscious of the wide scope of such a task, but I think our time will not be unprofitably spent if we direct our attention more particularly to the surgical treatment of the chronic forms.

It is now many years since the late Lawson Tait gave that great impetus to pelvic surgery by advocating the removal of pus distend tubes, which has since borne such mighty fruit. Yet, notwithstanding the lapse of time, it may be permissible to now reconsider the subject in some of its aspects.

It is now pretty generally conceded that the most potent and frequent causes of pelvic suppuration are gonorrhœa, puerpural sepsis, and tuberculosis. the route of infection being from the endometrum through the fallopian tubes to the ovaries and pelvic peritoneum, though recent investigation appears to show that an avenue of infection may also be found by way of the lymphatics in the broad ligament. Once the infection reaches the intra-pelvic structures, an exudation of lymph takes place with more or less adhesion of neighbouring structures.

It is interesting to note how definitely these adhesions form, and a knowledge of their disposition is of prime importance to the operating surgeon.

And the efforts of nature to limit the onward progress of the inflammation are well illustrated by the dense adhesions formed, with adjacent structures, so that it may be taken as a general rule the firmest adhesions are found nearest the centre of infection.

The part played by the great omentum is of peculiar interest, and it may be that one of its most important functions is to guard the general peritoneal cavity against intrusive micro-organisms.

For example, the omentum will, in nearly every case of pelvic suppuration, be found taking an important place in the endeavour to shut off the line of infection. Again, on the left side of the pelvis, the inflamed tube will most frequently be found glued to the mesentery under the sigmoid flexure of the colon. On the right side, the heavy distended tube will usually gravitate to the floor of the pelvis, and become adherent to the rectum, rarely attached to the cæcum and appendix vermaformis. The natural termination of such conditions, if one may use the term, will obviously be (since pus will find an outlet if in any quantity) by rupture into the bowel, or it will travel along the line of adhesions, setting up localised abscesses here and there, even to finding an exit through the abdominal wall, as I have seen in one case. The most frequent site of the collection of pus is, of course, in Douglas' pouch.

As bearing on the treatment of these cases, it is important to remember that the course in the large majority is very chronic, with occasional acute exacerbations. Probably it is owing to this chronicity that the pus loses some of its virulence, for it is well known that pus taken from a chronically-distended tube will in most cases prove sterile. The exacerbations are doubtless due in many instances to invasion of the pus loculi by the colon bacillus.

It will not be necessary to remind you of the symptomology of these conditions of pelvic inflammation as they are only too familiar. But I may perhaps be allowed to draw your attention to one or two peculiar features.

It is really surprising to see a patient presenting few, and certainly no marked symptoms, and yet at operation a large quantity of pus will be found distending a tube.

In one of my cases the patient travelled about 1500 miles with a measured pint and a half of pus in one sacculated tube, and yet she complained of only a few insignificant troubles, and could with difficulty be persuaded as to the necessity for operation.

It would appear that so long as there is no leakage into the peritoneal cavity, or reinfection by the colon bacillus, a chronically-distended tube will give rise to few signs.

One other peculiarity may be mentioned, and that is how frequently chronic salpingitis with pus is mistaken for a uterine neoplasm, more especially myoma. This is probably due to the amount of exudate which is thrown out, and which gives rise to the feeling of hardness and immobility on vaginal examination.

Treatment.—It will, I think, be universally conceded that where we have to deal with suppurative conditions the only safe treatment is operative. And I also think that this may be said also of those cases where the pus has burst through into the intestines. For it is only under very exceptional conditions that complete evacuation of the abscess cavity takes place, and the patient is thus, unless relieved of her suppurating tubes, the victim of chronic suppuration and all its attendant consequences until death brings relief to her sufferings.

Much discussion has of recent years been devoted to the best method of operating in these conditions—one school of gynæcologists pinning their faith to operation by the vaginal route, another firmly adhering to the older operation by way of abdominal section. Those that advocate the vaginal operation claim that that route gives better drainage, greater facility in dealing with dense adhesions, inasmuch as they are attacked from below; also, that the protecting line of adhesions is not broken through, and the risk of contaminating the rest of the abdominal cavity is thus avoided.

On the other hand, the adherents of the abdominal route maintain that these adhesions can be more successfuly attacked from above, and that the offending structures can be more certainly and more easily removed under direct vision, as can be obtained by the use of the Trendelenburg position.

The next important point at issue is whether, in the case of both adnexa being extensively diseased, the uterus should be amputated; the arguments in favour of this procedure being that the diseased appendages can be more easily and safely, when adherent to neighbouring viscera, removed; also, that as the appendages on both sides have to be removed, there exists only sentimental reasons for retaining the uterus. A more powerful reason for the removal of the uterus lies in the fact that in these bilateral cases the uterus is so infected that its retention is liable to prove a bar to the patient's complete recovery. Indeed, so far does Professor Howard Kelly go in this matter that in tuberculosis suppuration he splits the uterus in order to obtain visual evidence as to the condition of the endometrums, and if it is found to be infected he removes the uterus.

My own experience has been in favour of removing the uterus, the operation being simplified, and, contrary to what might have been expected, the patients bore the operation well.

In very severe cases where the patient has been greatly reduced by prolonged disease, it has been the practice of some gynæcologists to evacuate the pus per vaginam, washing out the cavity or cavities, and then inserting a gauze drain, taking care to part every recess. This procedure to my mind

has great merits for it allows time for the patient to recover some of her strength, and thus the removal of the adnexa can be afterwards done as may seem fit.

Intimately associated with this subject is the question of drainage after removal of the diseased structures.

I think I may safely say that the days of the glass tube inserted through the abdominal wound to Douglas' pouch are numbered, and it is quite unnecessary to discuss its demerits.

If drainage is practised at all it should be through the vagina, but I do not think the usual practice of using gauze for that purpose is efficient. Two objections will readily occur to you: the one, that the opening in the vaginal vault will rapidly contract down on the gauze, and so compress it as to stop the capillary flow; the other, that in consequence of this stoppage, the portion of gauze within the peritonial cavity will be surcharged with effete material, so that when the drain is withdrawn all this filthy material will be squeezed out into the as yet unhealed cavity.

I believe the best drain will prove to be rubber tubing of large calibre, and I must confess to a liking for the old-fashioned "T" rubber tube.

But my experience has been that it is only in very exceptional cases that drainage need be resorted to at all.

If care be taken to avoid soiling, by efficient packing off the field of operation, and afterwards instituting a methodical cleansing of the pelvis before any of the intestines return to that cavity, I am persuaded that drainage will be unnecessary.

And finally, before closing the abdomen, it is my practice to leave in the peritoneal cavity several quarts of normal saline solution to dilute any infectious material that may by chance have escaped the cleansing process, and facilitate the natural drainage powers of the diaphragm and healthy peritoneum. It must be remembered that the pus in such cases is probably sterile, or at most feebly virulent. So that the precautions taken are not against an active toxic agent, but merely to remove a material that may readily become reinfected by the bacillus coli communis.

My present position is that I would reserve drainage for those cases of an acute character in which there might be reason to suppose that a virulent toxic agent was still operative, and for some few where it seemed likely that the effused lymph might become imprisoned within the pelvic cavity, and so could not be dealt with efficiently by the healthy peritoneum.

Discussion.

Dr. Horne (Melbourne): Distinction in diagnosis should be made between infection of gonorrhœal or streptococcic origin, although sometimes the infection is mixed. Gonorrhœal infection can be diagnosed by the presence of pus in the urethra or Bartholinian gland. Gonococcus often causes occlusion of tubes, but I know of instances where pregnancy has occurred after removal of one tube and drainage of the other.

Dr. J. A. G. Hamilton (Adelaide): Technique of treatment of pelvic suppuration has much improved. The vaginal route is the best for attacking collections of pus; if laparotomy is necessary it can be done after. Drainage through vagina is not so perfect as might be wished, but is quite equal to abdominal drainage. Gauze keeps the opening patent long enough; it has always been my practice, when there has been a large raw surface, to pack from the abdomen. Gauze can be left in from five to seven days, but it is better to remove it after forty-eight hours; otherwise pus or sero-purulent fluid is apt to accumulate. If the suppuration is profuse, an indiarubber drain can be used. The opening from the vagina should

not be made too near the uterus, so that no ridge is left to interfere with drainage.

Diseased annexa should be removed, *together with uterus,* as the shock from this is less than that caused by separating adhesions; and they should be removed through the vagina. The time occupied by this route is also shorter, and the result is better.

Dr. Taylor Young (Sydney): Differential diagnosis is necessary in order to choose method of procedure. Some time ago I was an advocate for vaginal method only, but now by further experience find that method should be choosen. If multilocular cysts reaching above umbilicus are present, the abdominal method should be choosen; but in old chronic cases with intestinal adhesions less damage is apt to ensue by using vaginal method. The ureter can be protected by catheterisation. For drainage I prefer gauze to a rubber drain. In pelvic suppuration it is well not to be too conservative; organs which are the source of trouble should be removed.

The President: If left to nature pelvic abscess generally ruptures into rectum, more rarely into vaginal vault; the symptoms are relieved by this, but the general condition of the patient is made worse. The opening is generally too small to be curative.

In pelvic suppuration the symptoms are often few; so much so, that the patient does not see urgency for operation; but all cases should be operated to prevent rupture and septic peritonitis.

There is difficultly in distinguishing between myoma and pus sacs at times, more particularly when the cyst wall is thickened. But in myoma there is generally some enlargement of the uterus. In using bimanual care should be exercised.

Pus should be examined for sterility or otherwise, for future reference.

Abdominal removal of uterus with amputation of cervix, does not lead to atrophy of vagina and external genitals, as complete removal does. The uterus is, however, only removed when it forms part of the pus sac. I always curette before the operation, as endometrium may be source of infection. When the condition is tubercular, it is best to amputate the uterus; also, in highly virulent infections with a friable condition of the uterus.

In removal by the vaginal route the uterus must be removed to make room to get a pus sac; this is followed by atrophy of vagina and external genitals.

In acute cases, posterior colpotomy is indicated; and a search is made for a pus sac, which should be opened. Patients rapidly improve after this; but a relapse is likely even after a fortnight, sometimes with fatal results. After recovery from the acute condition, an abdominal section should be done, and the pus sac removed.

In other cases without constitutional symptoms a vaginal cœliotomy to empty the pus sac should be followed by immediate abdominal section. Risk of peritineal infection is much lessened by this method.

In cases of general sepsis, it is advisable to perform abdominal section subperitoneally (as in appendicitis operations), and to drain with as little interference with peritoneum as possible.

Preceding curettement in pus cases is a life-saving method.

Gauze packing was at one time advocated by me, but I found it caused effusion, and was apt to act as a cork. I now use a single strip of gauze only. When there is an encapsuled collection of pus behind the uterus, I use a rubber drain of large calibre.

In separating adhesions it is preferable to use knife or scissors; less likely to do harm than fingers.

Dr. Adam replied.

SOME INTERESTING GYNÆCOLOGICAL CASES.

BY

J. A. G. HAMILTON, B.A., M.B. (Dub.),

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WHEN the Hon. Secretary of this Section requested me to write a paper on some gynæcological subject, I wrote, offering a paper on "Uterine Deviations." But as I had met with a few interesting cases in my work during the last few months, I thought the notes of these cases would be of more practical interest to the Section than the well-worn subject of uterine displacements; so, with the consent of the Hon. Secretary, I altered the title of my paper.

CASE 1.—HÆMATO-COLPOS LATERALIS DEXTER.

There is no doubt that this malformation is by no means a common one. This is the first case I have met with in over twenty years' practice. The present-day teaching is decidedly defective on doubling of the vagina and uterus, and allied malformations. All the descriptions in the standard works on gynæcology are much too complicated, and are of little value from the standpoint of the practical surgeon. Little notice is taken of the clinical aspect of the cases met with, and too much notice given to the pathological anatomy as found by *post-mortem* examination, and the whole subject is further complicated by minute distinctions and Latin phraseology. I admit that I was unable to make a correct diagnosis in this case; but I feel sure that my experience in this one will enable me to make a correct diagnosis in the next case of the sort I meet with. Had I carefully read Dr. Pinnock's article in the transactions of the Brisbane Congress, I would not have made the mistake, made by every other operator on first acquaintance with this condition.

A.L., æt. seventeen years, a strong, healthy-looking girl, was transferred to my ward in the Adelaide Hospital from a medical ward on Oct. 7, 1901.

History.—Commenced to menstruate at sixteen years of age; periods always regular up to April last, then eight, eleven, seven, and eight weeks, very scanty; pains in back and sides at the time; "whites" since Easter; eight months ago began to be troubled with pain in her back and right side; about nine weeks ago noticed a lump in abdomen; for last few months has had occasional attacks of vomiting.

On examination.—Lower part of abdomen occupied by a rounded elastic tumour, filling greater part of pelvis, extending close to pelvic wall on right side, but not quite reaching pelvis on left side; a little below and to left of umbilicus is a rounded, slightly movable tumour, about the size of a tennis-ball. In the right iliac region, close to the anterior superior spine, is another similar tumour, somewhat larger and more fixed. P.V., a rounded, elastic rather than cystic, mass was felt bulging into and almost filling the vagina; a finger could be, with difficulty, pressed up into L. fornix, and an os could just be reached by a finger-tip high up on that side; cervix was obliterated; sound was passed with difficulty $3\frac{1}{2}$ inches, and to the left. Dr. J. C. Verco, who had transferred the case to me, and several of my colleagues on the staff, saw her on the operating table. Various opinions were hazarded as to the nature of the tumour. Professor Watson happened to come into the theatre at the time, and examined the case at my request. He immediately said it was a case of hæmato-colpos, and advised me to operate through the vagina. However, as the condition was new to me, I decided to open the abdomen and explore for myself.

Operation.—Oct. 10, 1901. When the abdomen was opened by the usual median incision, a thin, walled, sausage-shaped cyst presented itself, extending half-way up to umbilicus; on further examination this was found to be the upper part of bladder, pushed up between the pubic bone and the pelvic tumour. This parietal excursion of bladder I have often met with in vaginal and cervical enlargements. A catheter was passed, urine drawn off, and bladder subsided to its normal position; a large tumour was then seen, with a deep sulcus in the middle; to the left a normal uterus with normal appendages was seen; to the right, perched somewhat on the top of the tumour, was another uterus, somewhat distended, but with its ovary and tube normal. The tumour proved to be a didelphic uterus; tubes and ovaries normal, with a septate vagina right imperforate. The abdominal wound was covered with sponges, and the patient put in the lithotomy position; the left cervix was hooked down as well as possible, an incision made in R. vagina as close as possible to L. os, evacuating 30 ozs. of ropy, tarry blood; vagina washed out and lightly packed with iodoform gauze. The cavity was daily washed out and lightly packed. On the 27th the cavity in R. vagina was enlarged to admit two fingers, and its edges stitched. Patient made a good recovery. When last seen, early in January, she had menstruated once naturally; there was still a little purulent discharge from R. vagina; R. os could not be located.

I agree with Dr. Pinnock, when he says in his paper in Brisbane, on a similar subject, "There is little information in the textbooks upon the history and symptoms of patients suffering from this malformation." As the subject is scarcely less important from the standpoint of the obstetrician, I think it is worthy of more attention and better teaching than is generally accorded to it. I have looked up all the standard books on diseases of women and obstetrics, and cannot find a diagram of a didelphic uterus similar to this one, except in Duhrssen's little manual, where there is a diagram of a similar case, except that in his diagram the uterus on the imperforate side is more distended than in my case. Had I taken the advice of my friend, Professor Watson, I might have saved the patient the slight risk attending the abdominal section; but still, I feel sure, the lesson is more firmly impressed upon my mind by seeing the whole thing mapped out before me.

CASE 2.—UTERINE MYOMA, WHICH MIMICKED A PREGNANT UTERUS.

Mrs. R., aged thirty-eight, first seen in July, 1901.

History.—One child twelve years ago. No miscarriages. Menstruation regular; painful, not profuse; complains of pain in back and left side; frequency of micturition; bearing down pains.

On examination.—Abdomen occupied by a rounded, elastic tumour, extending a little above umbilicus, equal to a five months' pregnancy. There was a distinct pigmentation of linea alba, but breasts were flaccid and did not contain fluid. P.V. cervix patent, softened, and enlarged. Sound passed $2\frac{3}{4}$ inches. The junction of uterine body and cervix was flaccid and compressible, as in "Hegar's sign." Diagnosis:—An ovarian cyst, or a soft myoma of uterus. Operation advised. On account of family reasons she had to leave the hospital, and did not return until the end of October, when her condition was much the same as four months previously.

Operation.—Nov. 1, 1901. Abdomen opened by median incision from umbilicus to pubis. A large rounded tumour presented, very much like a five months' pregnant uterus; the walls were pliant, and contained a hard mass, which, on palpation, simulated the head, buttocks and shoulders of a fœtus. Had I not known the history of the case, I might have feared I had opened an abdomen containing a pregnant uterus. The right side, the easy one, was the first attacked, the round ligament of that side lying in front of the tumour was double-clipped, divided, and ligatured; the top of

infundibilo pelvic fold on same side was clipped between two forceps, cut, divided; a ligature was placed around ovarian vessels; the uterine artery was clipped with a Howard-Kelly forceps, cut, and ligatured; a Doyen placed on the uterine cornu, and the R. broad ligament divided; the tumour was then easily delivered. The left round ligament, which was below the tumour, then became apparent, and the vessels were dealt with as on the other side; the peritoneum in front divided between the two clips, and the bladder pushed down; the tumour was then amputated, leaving a nice cup-shaped cervix (the latter was much smaller than I expected). A piece of gauze was pushed into vagina, and edges of cervix strapped together with five interrupted tendons; peritoneum top-stitched all round, and abdomen closed by four layers of sutures. Patient made an excellent recovery, and was discharged on December 1, a month after operation. The tumour, on examination, turned out to be an intramural hard myoma, developed in the posterior wall of the uterine body, and entirely surrounded by a myxomatous capsule, easily mistaken for the amniotic sac, between which and the uterine tissue was a space containing blood-stained fluid. The uterine cavity was uninvolved, and the space around the growth had nothing in common with the uterine cavity, which it simulated. The junction of the corpus uteri and cervix was flaccid and compressible. This condition, known as "Hegar's sign," is an interesting feature in this case. Many authorities assert that "Hegar's sign" is never present except in a pregnant corpus. This sign depends on a marked softening and compressibility of the isthmus; that portion of the uterus, which is in part the lower extremity of the corpus, in part the upper of the cervix. This segment of the uterus becomes soft, thin, yielding, and elastic, while the fundus above and the cervix below remain comparatively firm. If "Hegar's sign" is present, is it a positive sign of pregnancy? C. Reinl and P. Compes, two of Hegar's assistants, consider it as such, and state that it does not occur in the presence of tumours. Galabin says, "That the compressibility is due to the walls of the fundus becoming expanded and softened, while the ovum does not yet fill its cavity." Noble says, "I have never seen 'Hegar's sign' present when the uterus was not pregnant." On the other hand, Hirst states that the sign is not always appreciable in pregnancy, and that it may also be elicited in a uterus softened by congestion or inflammation. Lusk thought that it was not conclusive, as its absence had been observed in early pregnancy, but a condition closely resembling it had been noticed in certain morbid conditions of the non-pregnant uterus. Jellet says, "This is a reliable sign of pregnancy, very constant and very characteristic; it may be observed from the second month onward, but may possibly be observed in a non-pregnant uterus." We thus have eminent authorities differing on the value of this sign as a diagnostic symptom. Which is the correct view my experience will not permit me to say definitely; but I am unable to find reported a case of myoma of the uterus in which this sign was present. Myoma of the uterus, which simulates pregnancy, are frequently met with. Many skilled operators have mistaken a pregnant uterus for a myoma, and only found out their mistake when the abdomen was opened. I operated on a spinster, æt. thirty-four, a short time ago for myoma of the uterus. The question of pregnancy was out of court. However, when the abdomen was opened, a tumour, in many ways resembling a pregnant uterus, presented itself. So much so, that when the sail-hook, which I use to deliver large myoma, tore through the thin wall of the uterus, some fluid escaped, and a dark mass appeared through the tear, which was a submucous fibroid, but closely resembled a fœtal head. A bystander of great experience suggested I should do a Porro.

CASE 3.—ADENO-LIPOMA OF R. OVARY, AND ADENO-MYXOMA OF PANCREAS.

Mrs. C., æt. sixty-three. Seven children; youngest nineteen years ago. Menses ceased at fifty. For last twelve months has had, off and on, a malodorous blood-stained vaginal discharge; sometimes passes clots. When first seen was very emaciated; abdomen distended with free fluid; there was also some fluid in R. pleura; the lower part of abdomen was occupied by an irregular-shaped tumour, extending nearly to level, and somewhat to right, of umbilicus. P.V. vaginal walls protruding cystocele and rectocele; cervix softened and patent, pushed up against pelvic bone; fundus pushed down into Douglas' pouch, and slightly to right; sound passes 4½ inches. At this time I saw her in consultation with Dr. W. T. Hayward. We looked upon it as a case of polyorromenitis, with probably a malignant tumour of R. ovary; however, under treatment, with two or three aspirations of abdomen and pleura, her general health improved very much, and when the abdomen was free of fluid the tumour, which had grown rapidly, could be more definitely palpated, and was found to be an ovarian tumour, springing from R. side, and it was decided to operate.

Operation.—Nov. 11, 1901. Abdomen opened by median incision; a large, rounded, semi-solid cystoma presented, about the size of a large cocoanut. The tumour, which had a narrow pedicle, was easily and quickly removed, by ligaturing the ovarian vessels and dividing the broad ligament across to the uterine cornu, clipping and tying the up-branch from the uterine, when it spurted. Unfortunately, some evil fate tempted me to explore the abdomen further, and I found another tumour, about the size of a tennis-ball, situated behind the stomach and attached to the pancreas. I found this easily enucleated in front, so was tempted to go on; but, unfortunately the lower part was firmly fixed in the pancreas, and in trying to enucleate it, the superior mesenteric vein, which was attached to tumour, got wounded. The patient never recovered consciousness after the operation, but lay in a semi-comatose condition, only passing 7 drs. of urine in the first twenty-four hours, and died on the fourth day. Had I limited my attention to the ovarian tumour. I feel sure the patient would have survived; but I am afraid my ill-advised surgical zeal brought about the fatal termination. This was particularly vexing, as this was my first death in a series of sixty-five cœliotomies, including nine hysterectomies, extending over a period of six months.

On examination of the tumours, the ovarian one, which weighed 2½ lbs., was solid and translucent, its fallopian tube was stretched over it; as the tumour got cold it lost its translucency; it was an adeno-myxolipoma, and contained glandular elements and myxomatous stroma. The pancreatic tumour consisted of a network of epithelial cysts, full of coloid material. There was probably some connection between these two tumours.

CASE 4.—ADENO-ANGIOMA OF ROUND LIGAMENT, SIMULATING A HERNIATED OVARY.

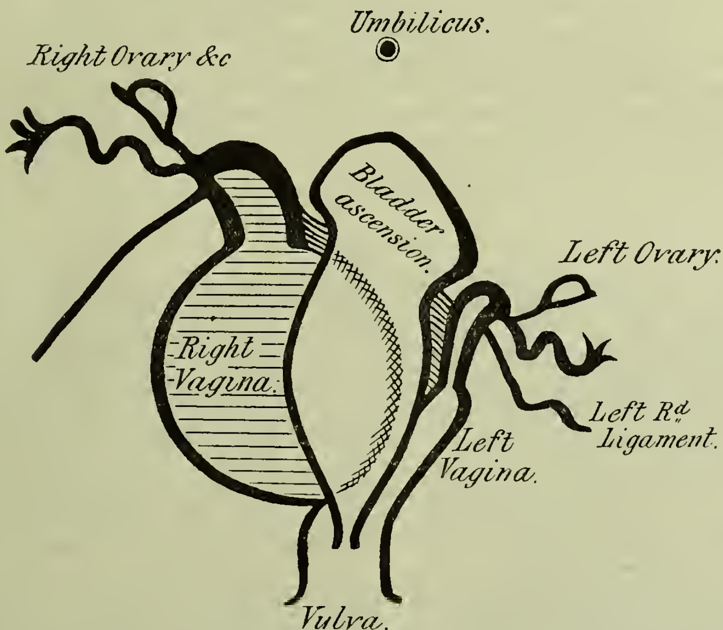
Miss T., æt. forty-six. In 1892 I saw this patient with my late colleague, Dr. Way. She then complained of a painful tumour in her right inguinal region. It was excessively painful to the touch, and on pressure produced the characteristic sickening feeling experienced on pressure on an ovary. The patient assured us the pain and swelling increased at her menstrual periods. She had been ordered to wear a truss by her medical attendant, but was unable to do so on account of the pain it caused. P.V., the uterus was normal; the left ovary could be felt, but no ovary could be felt on right side. We naturally concluded she had a herniated ovary. A few months later, whilst travelling in Europe, she consulted a leading gynæcologist in

London. He agreed with our diagnosis. When she returned to Adelaide we removed this inguinal tumour, which, to the naked eye, resembled an ovary. A microscopical examination revealed an epithelial-lined cavity, which confirmed us in our diagnosis.

In November, 1901, she consulted me again for a painful tumour in her left inguinal region. She also had profuse menorrhagia and metorrhagia.

On examination.—A tumour similar in character to the one removed nine years before from the R. inguinal region was found to exist in the left side. P.V., the uterus was found to be the seat of a firm myoma.

Operation.—Nov. 10, 1901. The abdomen was opened, and the uterus extirpated, but to my surprise both ovaries were present in their normal position. (Photo. of tumour and ovaries shown.)



The tumour in L. inguinal region was also removed; it was adherent to skin, and also to pouch of peritoneum; it bled freely; round ligament was thicker than usual. On examination the inguinal tumour was found to contain dilated vessels, muscular and fibrous stroma, and numbers of epithelial-lined cavities. I do not know where the epithelium comes from, but presume it was from the Wolffian body. When the uterine body was cut into, it disclosed an ivory-white myoma, size of a hen's egg; a second intramural tumour of the same size existed in the posterior wall. There was hypertrophic endometritis; this, no doubt, caused the menorrhagia.

Case 5.—Hysterectomy for Malignant Adenoma of Corpus Uteri, with Papilloma of R. Ovary and Vagina.

Miss P., spinster, æt. fifty-eight. Menses ceased at fifty-four. Two years after a blood-stained vaginal discharge appeared; this continued for some time, and early in 1901 she consulted her medical attendant, who found a small papillma in posterior vaginal wall, which bled on touching. No abdominal examination was then made. The small growth in vagina was removed, and the bleeding ceased for a time. The growth was no doubt an implantation from the then unsuspected malignant adenoma of corpus

uteri. After a time the bleeding returned, and she complained of considerable abdominal pain and distension; this suddenly ceased, and she got a sense of relief—no doubt from the accidental rupture of the ovarian cyst.

First seen on Oct. 10, 1901. On examination abdomen contained free fluid; a rounded, solid tumour could be felt, reaching to within 1 inch of umbilicus. P.V., uterus enlarged, pushed down; sound passed 5 inches.

Operation.—Nov. 15, 1901. When the abdomen was opened a quantity of blood-stained fluid escaped. The R. lower quadrant was occupied by a cauliflower-looking mass; uterus was the size and shape of a three months' pregnancy. L. ovary enlarged to three times its normal size; it was multicystic. The corpus uteri was removed by Howard-Kelly's method; the finger was introduced as far as possible down between bladder and vagina; cervix drawn up, os first, like a reversed Doyen. Several pints of warm saline were used to empty the peritoneal cavity of a quantity of rust-coloured fluid; the peritoneum was a dull-red colour, more vascular than normal. There was some large and tender glands in both groins; they gradually subsided, and although still present, were much smaller, and not painful; this makes one think they were inflammatory rather than neo-plastic. The patient made a good recovery, and now, three months after operation, seems quite well.

Discussion.

Dr. Pike (Launceston): What condition was suspected before opening uterus? I had a similar case simulating pregnancy; the sound passed 6 inches into uterus. The actual condition was a tumour occupying the posterior wall of the uterus, while the anterior wall was flattened.

Dr. Rothwell Adam (Melb.): I met with an abnormality of the uterus only lately. The symptoms were pelvic pain; there was an ovary the size of a goose-egg—apparently cystic. While curetting before the operation, the sound entered to right of median line for $2\frac{1}{2}$ inches. On opening the abdomen a mucous body was seen, tending towards right side, resembling a tube in shape. On the left side I came upon wall of pelvis, where there was a sedimentary ovary, also an elongated fallopian tube; broad ligament on this side was also rudimentary.

Prof. Watson (Adelaide): I have four times seen the isthmus between the branches of didelphic uterus mistaken for broad ligament. I have seen four cases in which there was a hernial sac occupied by an abdominal viscus, ovary or otherwise. In some cases the growth is put down to pressure from truss, even where there is a real hernia containing ovary and tube. "Hegar's sign" as a rule is a sign of pregnancy.

President: I have seen only two cases of bi-comuate uterus. In one case there was a pregnancy in one side, and an ovarian cyst on the other, a condition in which an error could have been easily made. Have also seen a case of complete double uterus and vagina, in which the woman was delivered of a full-time child.

Degeneration of myomata is interesting, and sometimes complicates diagnosis. Diagnosis is also difficult in cases of œdematous myoma. Waiting to watch the rate of growth sometimes helps. I attach much importance to "Hegar's sign," being of use for diagnosis in the early stage. A distinct sense of fluctuation can be felt just above the internal os.

Malignant tumours are often associated with fluid; so much so, that I am always suspicious when there is much ascites.

Dr. Hamilton replied.

CAUSATION OF ECTOPIC PREGNANCY.

BY

G. Horne, M.B., B.Ch., Melbourne.

In determining the causation of ectopic pregnancy, the first point to decide is when fecundation took place. The date of labour forms a fair basis for calculation, if taken in connection with the duration of pregnancy. It is this latter variable that has led to such diverse results in the hands of different observers. The divergence has, in my opinion, arisen from trying to state the duration of pregnancy in days. Thus, Duncan makes the average 275 days; Veit, 276; Lowenhardt, 272; and Stadfeldt, 272.

I think the more correct plan is to take the equation—

$$\text{Duration} = 10 \times M$$

where M is the average number of days of the woman's menstrual cycle, counting from the beginning of one menstruation to the beginning of the next.

It is reasonable to assume that in women in whom each graafian follicle takes longer to mature, the ovum will take a correspondingly longer period to develop into the full-term child.

An unlimited number of illustrative cases might be given, but I will cite only one.

Mrs. R.P. has had three children. When engaging me for the fourth she drew my attention to the fact that she was always "over her time," about a fortnight or three weeks. Two hundred and eighty days from the last menstruation had been the basis of reckoning. On this occasion her husband left home two days after her last menstruation. Her menstrual cycle was twenty-nine or thirty days.

$$\begin{aligned}\text{Duration} &= 10 \times M\\ \text{,,} \quad &= 10 \times 29\cdot5\\ \text{,,} \quad & 295\end{aligned}$$

This proved correct to the day. In this case the dates of menstruation had been recorded for months before.

The next stage of my calculation was to collect a number of cases of pregnancy following a single act. In all of these, counting back from labour by the above method, the estimated date of fecundation was coincident with that of insemination. These facts led me to infer that fecundation normally occurs at or very near the time of insemination.

What, then, happens during the orgasm? Muscular action with turgescence of the tube will approximate its fimbricated ostium to the ovary.

As in the uterus, an increased fluid exudes from the mucous membrane, and supplies the medium in which the ovum may be wafted on the desired course, by the peristaltic movements and action of the vibratile cilia. While the fallopian tube thus grasps it, the ovary will share in the increased blood-supply.

A graafian follicle just before menstruation, and on the eve of rupture, would receive a sudden accession to its fluid contents, and bursting thereby, would discharge the ovum under the most favourable circumstances for immediate conduction towards its future resting-place.

In support of this hypothesis, I might mention those cases in which ovarian premenstrual pain from a protruding graafian follicle has disappeared during coitus; also Coste's experiments, proving this rupture actually takes place in rabbits.

Many ova certainly do not travel directly to the tube. On these, however, the vigorous action of the tube during coitus will doubtless be exerted

more successfully than at any other time, and so the coitus tends to secure a recently-discharged ovum.

That the absence of orgasm will tend to prevent conception is firmly believed by the laity, and has a large basis of truth. This is confirmed by observations of Hirst and others.

The following is a typical case:—Miss E.M. had been in the habit of having sexual intercourse for more than a year. The only precaution taken against conception was the restraining the accession of the orgasm. Under the stimulus of champagne she neglected to do so, and became pregnant, I calculate, on that date. Numbers of such cases could be given.

Exceptional women repeatedly conceive, though always passive. With regard to these it should be remembered that the actions ascribed to the tube, &c., though culminating in the orgasm, are present throughout the congestion of coitus. Fertilization by artificial insemination is, of course, also possible, but does not occur with any certainty.

There is another well-known group of facts that have a distinct bearing on the theory I wish to enunciate. Connection from a fortnight after to a week before menstruation, with its concomitant ovulation, is not followed by pregnancy. Exceptions are rare.

Spermatozoa continue alive and active for a long time, probably three weeks, certainly always more than a week. Spermatozoa discharged into the vagina during this barren period must therefore be living and active in the uterus and tubes when and after the graafian follicle ruptures; yet they do not fertilise the ovum.

The assumption may fairly be made that the act of copulation has some influence in producing rupture of the graafian follicle; also in bringing the ovum into the fallopian tube, whether shed at that time or shortly before; that the muscular action of the vagina brings the spermatozoa to the uterus if that organ has not already sucked them up; that analogous actions on the part of the tube secure the presence of the ovum, and that by these actions conception normally occurs.

I think that we will find the causation of ectopic pregnancy in some failure of this normal procedure, by which passage of the ovum to the fallopian tube is delayed.

There are many theories propounded as to why the fertilised ovum should fail to reach its normal habitat. The obstructive theory containing a modicum of truth, is absolutely insufficient to account for the vast majority of cases. Taylor, in 42 instances, only mentions the probability of obstruction in one, and when the size of the ovum ($\frac{2}{10}$ mm.) is considered, it will be realised that nothing short of absolute occlusion will suffice.

Similar case are recorded by Dr. Balls Headley, C. Webster, Eden, and many others.

Pregnancy frequently happens at the infundibulum, and even on the fimbræ. Cases of ovarian pregnancy also are well-known, and in all these obstruction is out of the question.

When a tumour is present we are prone to argue the *post hoc ergo propter hoc.*

I have only seen one case where old inflammatory adhesions might have produced some narrowing of the lumen. In this a bristle could be passed on the specimen after operation.

There are also reports of pregnancy recurring in a tube that, being found patent, was not removed. Although most authors mention obstruction as a cause, they all agree that pregnancy is most likely to occur in an apparently healthy organ.

Bland Sutton writes (and accentuates it with heavy type), "A healthy fallopian tube is more liable to become gravid than one which has been inflamed." Eden says, "There is no evidence to prove that diseased

conditions of either uterus or tubes play any part in its occurrence." Similar views are held, of course, by Webster, Taylor, and all recent authorities.

Loss of ciliated epithelium is purely a hypothetical cause, and most observers have found it intact. The theory arose from a mistaken notion as to the function of menstruation, which was held by Lawson Tait and Berry Hart to occasion a denudation necessary to the successful implantation of the ovum in the uterine cavity.

Failure of tubal peristaltic action as a cause is mentioned in a half-hearted way by Taylor, Hirst, and others, and the firstnamed author mentiond four cases out of forty-two in which he found atrophy of the tube.

A somewhat similar condition is described by Freund as a fœtal type. Its narrow calibre is supposed by him to obstruct the ovum. I have seen one such case, and in it the pregnancy was infundibular, and the tube patent, easily admitting a probe.

Fimbrial and ovarian pregnancies (of which I have collected records of several undoubted cases) could not be accounted for by this lesion, which at the best appears to be only an accompanying circumstance.

Webster's theory is that pregnancy occurs in those tubes which have a recurrence to an embryonic type, when uterus and tube were one, and which therefore have an atavistic tendency to form a tubal decidua.

He has not succeeded in demonstrating that the decidual changes found are the cause of the ovum's retention; or even that a tubal decidua in the same sense as the uterine decidua exists at all.

Ovarian pregnancy has, since the publication of his "Ectopic Gestation," been fully established, and considerably invalidates his position. In that work (1895) he surmounted the difficulty by denying its possibility.

In seeking the cause, I will adopt the plan of stating a series of facts, and then drawing inferences from them:—

1. As a rule the pregnant tube is healthy. The only lesion that is suggested is an atrophy of the muscular coats.

2. Recurrence occurs in about 5 per cent. of cases. Dr. Haig Ferguson made this calculation on all recorded cases; but it is necessarily very inaccurate. There are, however, about sixty cases on record. The tube left may be assumed to have been healthy.

3. There is a history generally of relative sterility. In Taylor's table of forty-two cases, he only states nine to have been pregnant within three years. In connection with this it must be remembered that a woman who has just borne a child may be sterile through the accident at that particular event. This would probably swell the percentage. In cases that have come under my personal observation, 82 per cent. have been relatively sterile.

4. There is frequently a history of inflammatory trouble. This is seldom or never associated with gonorrhœa, which occludes the tube and destroys the tubal epithelium. It is very commonly found following miscarriages. In 27 per cent. of Taylor's cases of parous women, there was this history. My own experience is that almost invariably there had been a miscarriage or a severe labour, with bad recovery, in cases of ectopic pregnancy in parous women.

5. In two of my cases there had been previous pregnancies, with anencephalic monsters.

Hirst points out that anencephalos would be caused by some interference with the normal development during the second or third week. Naturally, this interference would affect the head end, which is the first to be defined.

6. Hirst associated absence of orgasm with tubal gestation. Leith Napier also mentions a case; and in one which I have recently seen, this

also is a marked feature. This, as I have pointed out, is associated with relative sterility; the cause being the non-securing of the ovum at the time of coition.

7. There is evidence in a large percentage of cases of tubal gestation that the ovum has not immediately reached the tube after leaving the ovary In two of my cases there is negative evidence that it came from the opposite side. Dr. J. W. Williams, in a series of thirty, found that five ova came from the opposite ovary.

8. Only one pathological condition have I been able to find constantly in connection with ectopic gestation. There is always a thickened tunica albuginiea, with resulting retenton cysts. I have, generally, also been successful in eliciting a history of the ovarian dysmenorrhœa, so characteristic of the lesion. In all the specimens I have seen this condition is present; and most of the plates and diagrams dealing with the subject show this cystic ovary.

One of the chief causes of these cysts is thickening from chronic congestion, which originates in masturbation or too frequent copulation; this also produces the absence of orgasm. Another cause of the thickening is a chronic inflammatory condition, which has spread by the lymphatics, and not by the mucosa of uterus and tubes. The tubal route is common in gonorrhœa, and often results in occlusion, while the ovaries may be unimplicated. The lymphatic infection may result from a lesion in the cervix or perinæum, and often entirely spares the tubes, while the ovaries are greatly affected. A case on which I operated at the Women's Hospital in June, 1901, illustrates this well. She had been confined five weeks, and ran a high temperature, with a pulse of 150. I found a broad ligament abscess about the size of a small orange, minute foci of suppuration in the ovaries; but yet the tubes appeared normal, and certainly contained no pus.

A similar thickening of the tunica albuginea occurs in nulliparæ. In all these cases the ovum is sometimes not discharged at all, and there is absolute sterility; or an occasional graafian follicle bursts, but its bursting is delayed, as the tough tunica albuginea would tend to prevent the rupture. A relative sterility is the result.

I have demonstrated that coition was the most favourable time for the passage of the ovum into the tube, whether it had been shed from the ovary a little while before, or burst at the time. Failing its entry then, the spermatozoa would come into contact with it in the peritoneum, or even in the ovary; this latter contingency is a normal method of impregnation in some sharks and rays. The usual fate of an ovum delayed in the peritoneum is destruction by that organ from its phagocytic powers. It is possible, however, for it to maintain its vitality while it travels from one side to the other; this is a common occurrence. The ovaries are seldom examined; but I have two, each removed from the same side as the tubal pregnancies, that show no trace of corpora lutea, which must, therefore, have been on the opposite side.

The experiment in bitches and the operation in women of removing one ovary and the opposite tube also proves the possibility of external migration.

Escaping the dangers of the peritoneum, it arrives impregnated at the tube, and is in an already advanced, or rapidly advancing, stage, with the plasmodial layer of the epiblast ready to plant the ovum on the first available soil. In many cases the passage of the tube might be successfully accomplished; but in these the impregnation would not have been followed quickly enough by the increased nourishment necessary for proper growth. Abortion would tend to result, or even, it is quite conceivable, that on rare occasions the arrested development from insufficient nutrition would produce monstrosity.

Contact with the tube would, however, lead the impregnated ovum to determine that site as its resting-place, and tubal pregnancy is begun. To originate a tubal pregnancy the ovum must avoid the carnivorous action of the peritoneum, and it is there that, no doubt, the vast majority end their course.

To summarise: I hold that obstructions and similar conditions of the tube play but an insignificant part in the production of tubal gestation; that the power of response to germinal impressions is not characteristic, as Webster avers; and that the main cause of extra-uterine gestation is the abdominal fertilising of the ovum, whereby it arrives in the tube in an active state.

Ectopic impregnation is, I believe, largely due to a condition of ovary that prevents rupture of graafian follicle during coition. A similar result may occur from an absence of orgasm, though the stimulus of connection would, in this case, tend to secure the passage of the ovum to the tube.

The history, therefore, of most cases of ectopic pregnancy will be as follows:—There is some chronic congestion or inflammation of the ovary, probably dating from a severe labour or miscarriage. The tunica albuginea becomes thickened, and does not permit the rupture of a graafian follicle during connection. The spermatozoa reach the ovum before it enters the tube. The active fertilized ovum then implants itself upon the first available site, not because its passage is obstructed, but because, with fertilisation, a new and increasing force is kindled in its epiblast.

Discussion.

Dr. Cowen (Eaglehawk): How do women with a three weeks' menstruation fare as regards their time of pregnancy? I think passive conception fairly frequent. The uterus and adnexa cannot be in the usual healthy condition if ovarian capsule is thickened.

Dr. Taylor Young (Sydney): The labour equation would be liable to lead to serious discussion in courts of law.

Dr. Rothwell Adam (Melbourne): It is most difficult to account for occurrence of ectopic gestation; there must be a delay between meeting of ovum and spermatozoa, but the cause of this delay has not hitherto been explained.

Dr. J. A. G. Hamilton (Adelaide): Relative sterility indicates something wrong with tube or ovary: if it were due to occlusion of the tubes, it would be frequent in old gonorrhœal cases; but that is not the case.

The President: Hypothesis is always of use in stimulating enquiry. A thick tunica albuginea is extremely common, especially in girls married late in life; it is due to chronic congestion. Absence of orgasm does not preclude pregnancy; nor is a safe period right practically.

Pelvic trouble is common as a forerunner of ectopic gestation. Involuntary expulsion of semen may be due to negative abdominal pressure, and is generally associated with conical cervix, which prevents aspiratory efforts of uterus.

Dr. Horne replied.

NOTES ON A CASE OF SYMPHYSIOTOMY.

BY

E. Alan Mackay, M.B., B.S. (Melb.),

Honorary Surgeon to the Outpatient Department of the Children's Hospital, Melbourne; formerly Senior Honorary Surgeon to the Midwifery Department, Women's Hospital, Melbourne.

Cases of symphysiotomy are so rarely recorded that every one is of great interest. This one is interesting not only on account of the operation, but also because of its previous and after history.

Mrs. C., a strong and healthy-looking woman of medium height, but excessively fat, a multipara, aged thirty-five years, came under my care at the Women's Hospital in 1898. She was then in the sixth month of pregnancy; and came to beg that labour might be brought on, saying that she could not again face what she had gone through in previous labours. This was her seventh pregnancy, not counting several miscarriages. The history she gave of her six previous confinements was appalling. Briefly, it was this: the first child was born dead at full term after a very protracted labour and difficult instrumental delivery; the second time craniotomy was performed at full term; the third child, a very small one, whose weight was not taken, was born alive—it was probably not full term, but of this the mother was uncertain—the child, however, lived and thrived; the fourth time labour was induced at the eighth month, but again craniotomy had to be performed; the fifth time she again went to the full term, and again craniotomy had to be performed; the sixth time labour was induced at the seventh month, and the child was delivered by podalic version, with considerable difficulty, and only survived a few hours.

Here was a terrible record—only one child living out of six, three of whom had been deliberately destroyed. She had the best medical attendance available; but that was before elective symphysiotomy with modern aseptic precautions became a recognised operation.

Her external pelvic measurements gave no useful information, owing to the thick and firm deposit of fat which increased them to an uncertain degree. The actual measurements obtained were $10\frac{1}{4}$ inches between the anterior superior spinous processes, $11\frac{1}{4}$ between the iliac crests, with an external conjugate of $8\frac{1}{4}$ inches. · I think this last measurement was quite an inch astray, owing to the fat. Internally the diagonal conjugate measured a shade over $4\frac{1}{4}$ inches, and as the pubic bones felt somewhat broader and straighter than normal, half an inch must be deducted from that, giving the true conjugate as a shade over $3\frac{3}{4}$ inches.

The sacral promontory was marked, and the pelvis was slightly contracted in its other dimensions, but I could not accurately measure them. The information obtained was however quite sufficient to show that the case was a suitable one for symphysiotomy.

The rule is that with a generally contracted pelvis symphysiotomy must not be done when the true conjugate is less than $3\frac{3}{4}$ inches, to allow of the delivery of a living child of average size at full term, though in the flattened pelvis, with the transverse diameter relatively wide, symphysiotomy may be done when the true conjugate measures only $2\frac{3}{4}$ inches.

The gain in the true conjugate diameter after division of the symphysis is from $\frac{1}{4}$ to $\frac{1}{2}$ of an inch, and the gain in the transverse and oblique diameters is from $\frac{3}{4}$ to $1\frac{1}{2}$ inch. The pubic bones may diverge $2\frac{3}{4}$ or 3 inches without injury to the sacro-iliac joints.

I explained the risks and the advantages of symphysiotomy to the patient, and after some discussion persuaded her to wait till full term and undergo the operation. Accordingly, in due time, she returned to the hospital, and labour began naturally on the morning of October 21, 1898. She was then prepared as if for an abdominal section; and when labour had gone on for some hours, and the os was nearly fully dilated, the membrances having ruptured, she was anæsthetised, and I proceeded to operate by the subcutaneous method. There are two methods of operating—the open, and the subcutaneous. The open method involves cutting directly down on the symphysis, wounding a highly vascular region where hæmorrhage is most difficult to control, and where there is risk of the wound becoming subsequently infected by lochial discharges. In the subcutaneous operation an incision is made in the mid-line, beginning at the supra-pubic eminence, and extending upwards for about 3 inches. This I did; but had to go through several inches of fat before reaching the recti muscles; and in order to separate the recti, and get my finger into the retro-pubic space, had to extend my incision upwards and downwards. Going downwards, I cut into the venous plexus over the face of the pubes. There was some free hæmorrhage, but pressure with a tampon stopped it at once. An assistant now passed a metal catheter and held the urethra to the left side, until the division of the symphysis had been completed; the bladder had of course been emptied just before the operation was begun. An assistant standing on either side made pressure on the hip bones, lest on division of the symphysis the bones should spring apart too suddenly, and tear the soft parts. With the index finger of my left hand in the retro-pubic space, I now divided the symphysis with a blunt-pointed bistoury, cutting from above downwards, and from before backwards. I then divided the inferior pubic ligament, and in doing this cut into the venous plexus on the anterior wall of the vagina. There was a sudden gush of alarming hæmorrhage, which I can only describe as a flooding. I hurriedly plugged tampons into the wound, but the blood continued to well up, until an assistant made counter pressure through the vagina; this was instantly effective, and after about two or three minutes of steady pressure there was no return of the bleeding. The wound was now plugged, and, the os being now fully dilated, delivery was very easily effected with long forceps, the patient lying on the back, with the knees raised and everted, while pressure was maintained on the hips at each side. The presentation was left-occipito-anterior. The child was a well-developed male, weighing over 7½ lbs. It cried at once and gave no further anxiety. The placenta and membrances came away complete within a quarter of an hour. The metal catheter was again passed in order to prevent the urethra or the anterior wall of the bladder from getting nipped when the symphysis was closed again. The pelvis was then strongly pressed from each side, the legs brought together, and the knees inverted, so as to more completely close the symphysis; the wound was then sponged out, and closed with silkworm gut sutures, except at the upper extremity, where a drain of iodoform gauze was left; a dressing of iodoform gauze was applied, the pelvis was strapped with broad strips of adhesive plaster, and bound as tightly as possible with a very strong binder coming several inches below the trochanters on either side; the knees were tied together, and the patient put to bed.

Next day the dressing was removed. There had been no more bleeding from the wound, the gauze plug was taken away, and healing occurred without any suppuration. The puerperium was normal in every respect save that the catheter had to be used for a fortnight, and slight cystitis occurred, which disappeared after two or three irrigations with boric acid lotion. She complained of very great pain at the lower part of the back for some days, probably due to stretching of the sacro-iliac synchondroses. Her fatness made it most difficult to keep her fimly bound; the binder had to

be frequently loosened for passing the catheter, &c., and I could not always see to the binding myself; and it was not until later that I realised what a serious disability this was. If ever I had to do another case, I would have a wide leather binder made beforehand, with long straps and buckles, so that I might be sure of her being kept tightly bound for at least a month. This patient was kept on her back for a month, and constantly bound very tightly with a calico binder, but at the end of that time there was fully half an inch of separation between the pubic bones, and for two years she could only with difficulty walk a few steps at a time; still she managed to do her housework. She developed prolapse of the uterus; it came down whenever she walked. About two years afterwards she again became pregnant; had a severe hæmorrhage, and aborted at about two months and was curetted by another practitioner. The last occasion on which I saw her was about six months ago, nearly three years after the symphysiotomy, when she came to see me, to let me know that she had improved greatly during the last few months. She could now walk very well, though with a rolling-gait, and she said the prolapse gave her very little inconvenience, and she was not inclined to have anything done for it.

The fibrous tissue joining the pubic bones had evidently grown much denser, and this seems to be generally the case. In a good many cases reported from Europe and America difficulty of locomotion is referred to; but it is said to pass off in a few months. I must say that when two years elapsed without much improvement in my patient's walking. I despaired of her ever improving; and it was a great relief to me to find that towards the end of the third year she was walking fairly well; and one may reasonably assume that the improvement will continue. The prolapse was certainly an unfortunate result; but I do not think it was altogether due to the loosening of the symphysis. The perinæum had been considerably damaged in previous labours, and probably the severe instrumental treatment necessary in former confinements had something to do with the general laxness of the parts.

A few words as to the operation itself. The only difficulty met with was the very deep layer of fat on the abdomen. The operation itself is very simple, and easy to perform. Doing it by the subcutaneous method, and not extending the skin incision below the superior pubic eminence, one would avoid wounding the venous plexuses about the clitoris, and the wound would be well out of danger of being soiled with lochial discharges. With the forefinger in the retro-pubic space, the bladder is protected, and with the urethra held to one side with a sound or catheter there is no danger of wounding it. Galbiati's knife is quite unnecessary; it is better to use a straight, blunt-pointed bistoury, and cut towards the finger, than to try and insert the sickle-shaped knife under the symphysis. The violent hæmorrhage that occurred in my case was due to cutting too deeply when I was dividing the inferior pubic ligament, and might have been avoided; but as it was at once checked by plugging the wound, and applying counter-pressure from the vagina, it did no harm.

Provided that the operation is one of election there should be no mortality rate for symphysiotomy. If it is done aseptically in suitable cases, *i.e.*, those of the lesser grade of pelvic deformity, it entails no more risk to the mother than an ordinary confinement; less risk indeed than embryotomy, with the immeasurable advantages of saving the child.

The dangers to the mother are *sepsis*, which is avoidable; *hæmorrhage*, which, in the subcutaneous operation, ought not to be formidable; and injury to the bladder, which ought not to occur if the urethra is held to one side with the catheter by an assistant, and if the anterior wall of the bladder is protected by the forefinger of the operator while dividing the symphysis,

and if the urethra is again held out of the way, when the pubic bones are brought together.

It may be of interest to state that the mother suckled the child, which grew and thrived well, and that she stated that the possession of the living child compensated her for what she had gone through. She was a woman of great nerve, and of very placid temperament.

Within the last few weeks, a new operation has been recommended, of which I read a short description in a recent number of the *British Medical Journal*. I do not think it has yet been performed on the living subject. It consists in dividing the pubic bone to one or other side of the symphysis. The advantages claimed for it are: that the region of troublesome hæmorrhage is quite avoided, and that there is no risk of injury to the bladder, either by the surgeon's knife, or by it getting caught and compressed when the symphysis is closed again.

AN ANALYSIS OF SEVEN HUNDRED CONSECUTIVE CONFINEMENT CASES.

BY

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A PERUSAL of the paper on midwifery, read by Dr. Purdy at the Brisbane Congress, suggested so many points of contrast with my own practice, that I have thought it well to submit for the consideration of this Section a record of similar results arrived at by dissimilar methods.

The conditions and circumstances of my work were as follows:—

(1) A working-class neighbourhood, chiefly mining.
(2) No trained midwifery nursing.
(3) Responsibility has been assumed for all cases in which I have been present before the delivery of the placenta.
(4) No time limit post-partum. Personally, I do not think the statutory thirty days sufficient, as I have known cases in which, had death occurred six or eight weeks subsequently, it would have been as clearly due to the confinement as if but one week had elapsed.
(5) Miscarriages before the fifth month have not been included, though no fatality has occurred from this cause, as I consider them a factor in a somewhat different equation.
(6) The cases have been taken in the course of a mixed general practice, and, with very few exceptions, in spite of post-mortem work, or the currency of a septic case. I feel some diffidence in stating this condition, in view of the recent researches by the Ladies' Committee of the Melbourne Women's Hospital.

GENERAL PRINCIPLES.

In the general conduct of a case, my aim is asepsis for myself and antisepsis for my patient. I rely more on nail-brush and soap than on any antiseptic, though I invariably have a second bowl containing lotion beside me. After a post-mortem, and during the currency of a septic case, I take the additional precaution of submitting my hands and forearms to the routine detail required for surgical asepsis. No emollient is used, and no ante-partum douching, unless there is a suspicion of specific disease, or I find that the nurse has been "trying the pains." The vulvæ are bathed with antiseptic lotion before each examination, and, more frequently, before the birth of the head. In primiparæ especially, this can be done without exciting comment while one is attempting to save the perinæum.

I practise infrequent vaginal examinations, and am old-fashioned enough to think that abdominal palpation, in spite of all that is claimed for it, can never take their place. In at least 90 per cent. of cases, the condition of the maternal softs parts is of more importance to the accoucheur than the position of the child.

I have discontinued the practice of post-partum douching, unless there is some obvious indication for it, when I do it myself, using separate tubes for the vagina and uterus, and a rubber reservoir. Higginson's syringe has been discarded as a dirty and dangerous instrument, over which one can exercise no efficient control.

For the rest, it is well for us to bear in mind that it is a natural and not a morbid process with which we have to deal, and that Nature has provided very efficient safeguards for the parturient woman in the way of secretion, contraction, and direction of flow. It is for us to do our utmost to avoid

contaminating those secretions, or unnecessarily interfering with those processes.

Presentations, &c.

In the series of seven hundred cases, the large proportion of one hundred and eighty-four were primiparæ; the explanation being that, in my neighbourhood, a considerable number of the subsequent confinements are attended by midwives.

Of the presentations, six hundred and eighty-four were cephalic; of these, forty were noted as being occipito-posterior. This, however, cannot be taken as the full number of such positions, as some may have rotated before my arrival. My limited experience of occipito-posterior positions inclines me to question the approximate accuracy of Dr. West's estimate, that not more than 4 per cent. terminate with the face to the pubis. Of my last sixteen cases, I find it noted that no less than seven terminated in this way. I am not at all satisfied with my practice for the correction of these positions. In the large majority, I have found manual rotation difficult, and that the head tends to resume the vicous position. I have not attempted rotation with the forceps on, notwithstanding Smellie's "great joy," as I do not know what damage the blades may be doing in positions in which I am not accustomed to handle them. Still, it seems feasible that, with the vertex below the brim, and a pair of straight blades, the position might safely be corrected, and I shall be glad of expressions of opinion and experience on this point. In view of the relative frequency of this position, and the much greater relative delay and difficulty which it entails, the question of its forcible correction seems to me to be most important.

There were three face and brow presentations and two of the whole vertex, in which neither brow nor occiput showed any tendency to engage. I can find very little as to this condition in the textbooks, but I am quite clear that these were the two most difficult cases to deliver which have occurred in my practice. Both were large square-headed children; in both, the head remained high, and the forceps showed an inveterate tendency to slip. Ultimately, version was performed, and both children were born dead. Looking back I cannot but regard the failure with the forceps as fortunate, since delivery by that means must have involved serious injury to the soft parts.

There were fourteen presentations of the breech, one of the funis, two mixed (one arm and head, and one hand and breech), and two transverse.

Of three cases of placenta prœvia, two were partial and one central, the latter accounting for the only maternal death in the series.

Of eight cases of twins, two were premature, and in two the second child was stillborn.

Accidents.

Of three cases of eclampsia, one occurred during labour, one six hours, and one sixty hours subsequently. The two post-partum cases were very severe, but one has a much freer hand in treatment when delivery has not to be considered.

Of the various methods of treating eclampsia, I much prefer the preventive. I have notes of a case in which a woman came to engage me only three days before her confinement occurred, complaining of loss of sight, shortness of breath, epigastric pain and swelling of the legs. Vision was so much affected, that she even had to feel for the food on her plate, and out of doors she saw a "cloud of moving specks, just like a lot of sandflies." She was markedly anæmic, and had a soft, rapid pulse. The urine was loaded with albumen. It seemed to me that she presented all the conditions for a bad, and if it did supervene, a probably hopeless eclamptic attack. I at once put her on milk diet, and a diuretic and sedative, and prescribed complete rest.

When called to her confinement, I gave a hypodermic of morphia, and, as soon as I had made an examination, put her under chloroform. Twitching of the corners of the mouth was observed, but nothing general developed. She was delivered instrumentally, and made a good revovery as far as the confinement was concerned, though it was months before her renal and cardiac symptoms entirely disappeared.

Eighteen children were born dead, but of these six had been dead for some time; one was hydrocephalic, two were the second of twins, and one was born before my arrival, leaving only six which could fairly be attributed to difficult and retarded delivery.

In six cases only has there been serious post-partum hæmorrhage, two occurring in the one individual; on the second occasion in spite of careful preliminary treatment for three months with ergot and strychnine, the exhibition of ergot when the os was dilated, and constant control of the uterus from the moment the head was born.

In six hundred and eighty-four head presentations, forceps were applied one hundred and eight times, or, on an average, once in six and a third labours. During the first four years covered by the series, forceps were used in fifty-seven cases out of two hundred and ninety-one, and during the second four years, in fifty-one cases out of three hundred and ninety-three—the former representing a frequency of one in five, or 20 per cent.; the latter, one in seven and three-quarters, or 13 per cent. Of one hundred and eighty-four primiparæ, sixty-five were forceps cases, an average of one in less than three, or 35 per cent.; but for the first four years the percentage was 40, and in the second it fell to 30 per cent. Even these percentages sound high, but not when compared with Dr. Purdy's figures, which show sixty-four applications in eighty-five primiparæ, equalling 75 per cent.

I do not propose to deal at length with the very difficult question of forceps delivery. It will be seen from the above figures that my tendency has been to a greater conservatism in their use, to the advantage, I am fully persuaded, of both mother and child. In my last one hundred cases, which include twenty-eight primiparæ, I find I have only used forceps eight times, six being in primiparæ, and yet I do not hesitate to assist when I find that Nature is not effecting progress. Milne Murray's aphorism is excellent—"Only apply the forceps when the danger of delivery is less than that of delay"—but what a rare amount of wisdom and experience its true interpretation requires!

I learn from a friend, recently in residence at the Rotunda, that the use of the forceps is much less frequent there than it was a few years ago, and I hope that Dr. Jellett will see fit to include in his most valuable appendix, statistics as to the condition and frequency of forceps application, and the percentages of injury and morbidity which it carries with it. Of this I feel sure, that forceps are used too early, and much too often, and that this is a factor in the maintenance of the high puerperal death-rate. We have been too ready to take advantage of the immediate immunity afforded by antisepsis, and to lose sight of the more remote effects. Still, it must not be forgotten that it is to the abuse of forceps we owe the development of gynæcology. I retain my preference for the Barnes-Simpson pattern, with all metal handles, using a tractor when required. I do not secure the handles in any way, the screwing down of the head in the ordinary axis-traction instrument constituting my personal objection to its use. In primiparæ, I always remove the blades when the head is well down on the perinæum, and I further seek to avoid rupture by following the head down with the perinæum until I see that its largest diameter is about to engage, when I tilt the occiput backwards, and slip the perinæum over it in the absence of a pain. The question as to removal or non-removal of the blades at this point seems to me to be simply one of gradual versus rapid dilatation.

The Management of the Third Stage.

This, more than anything else, marks the dividing line between safe and dangerous midwifery. In it lies the key to the prevention of post-partum hæmorrhage, and in the great majority of cases, of puerperal sepsis also. Antiseptic precautions may carry the accoucheur safely through many an error in the use of the forceps, but they will not save him from the consequences of want of thought and want of patience in the delivery of the placenta. So far as I am aware, it is only within the last few years that the necessity for a more rational and deliberate treatment of the placenta has been borne in upon the profession at large. Credé's method had become a positive fetish, and comprised all that was worth knowing about the third stage of labour. It was indeed all that I carried away of the teaching in my own student days on the subject. And yet, practised as it has so generally been without limitation as to the time and force, I take it to have been the most important factor in the maintenance of the puerperal death-rate. It is not I think generally remembered that, shortly before his death, Credé recommended a lapse of thirty minutes before his method was to be attempted. My own practice is to follow down the uterus after the birth of the head, and then, with the hand over the uterus, to watch rather than control it for twenty minutes. I am sure I did harm, in my earlier cases, by trying to maintain contraction of the uterus at this stage; it is not Nature's way; it is goading the jaded steed, which only asks rest, and it will do all that is required. I have not seen hour-glass contraction since I abandoned this procedure.

After a few pains, the uterus will be found to rise above the pubis, this signifying, according to Professor Byers, that separation of the placenta had been effected. Then, during a pain, with the whole hand square above the fundus, I follow down the uterus, and it is not until I have repeated this manœuvre without success that I attempt expression by Credé's method. In more than 95 per cent. of my cases, nothing further has been required. If, however, after the lapse of half an hour, further attempts at expression give the impression of organic immobility, which one soon comes to recognise, I do not hesitate to remove the placenta manually. I find that this has been done twenty-five times in all, including the removal of retained membrane, and I shall be interested to learn how this percentage of $3\frac{1}{2}$ compares with the practice of others. With careful preparation of the hand and forearm, I have found the procedure both safe and satisfactory, and I am convinced that the warnings of the older textbooks, as to the very grave danger of the proceeding, have often tempted the attendant to employ force sufficient to detach the main body of the placenta from an adherent portion. It is only in cases in which true expression has been employed that I find difficulty with the membranes. I then support the placenta on the palm of the hand, and, waiting for relaxation of the uterus, use gentle traction in the axis of the canal, always stopping short at the slightest suggestion of a "give." I prefer this to the method of twisting the membranes so commonly recommended, as this seems to reinforce the stronger as against the weaker portions, and so to increase the liability to tear.

As a matter of routine, the placenta and membranes are examined, and if I conclude there has been retention of a portion, I go in search of it at once. In cases where early escape of the liq. amnii suggests that the membrances are unusally friable, additional care is necessary in the removal of the placenta. In such a case, I have known the placenta to appear stripped entirely of membranes by its own weight.

The Post-partum Pulse-rate.

On the conclusion of labour there occurs, in a fair proportion of cases, a phenomenon, to which it seems to me sufficient attention has not been given. I refer to a marked fall in the pulse-rate. One textbook speaks

of this as beginning eight to forty-eight hours after labour; another, vaguely, as being most marked on the second or third day. I have notes of its occurrence in nine out of my last one hundred confinements. Of these, three were in first cases, and gave the following counts:—

(1) Ante-partum pulse-rate not recorded, but next morning pulse was fifty, counted to the full minute, and on the third day it was fifty-eight.

(2) Ante-partum pulse-rate sixty-five to seventy; fell to forty-four within a quarter of an hour after expulsion of placenta.

(3) Very tedious case; pulse sixty-four before putting on forceps under chloroform; placenta was expelled spontaneously, and pulse fell to fifty-three.

Two were second cases, one a third, two fourth, and one sixth. In the last, the ante-partum pulse-rate was sixty-six, and there was great distension of the uterus, both placenta and child being very large; six hours after the pulse was forty-five, and on the second day sixty. They all gave counts of fifty-three to forty-eight. In one only was the lowest count noted as occurring thirty hours after, and in the remaining eight it was just after the expulsion of the placenta.

There are cases which almost invariably make good recoveries, and it may be inferred from this that there is nothing pathological in the phenomenon. The explanations offered in the books do not all satisfy me, as—that it is due to the mental and physical rest which follow delivery, and the sudden diminution in the amount of labour put upon the heart, &c. These are common to 95 per cent. of confinements, but the fall in pulse-rate occurs in but a small percentage. I am not prepared to define the true significance of the phenomenon, but I have a suggestion to make as to its occurrence. I premise that the parturient woman has a varying physiological amount of blood to lose. When this is exceeded, the pulse rises, and much in proportion to the excess, the heart being spurred to supply the wants of the economy with a diminishing quantity and quality of blood. On the other hand, when less than the usual amount of blood is lost, and this has been true of all the cases I have observed, the heart has more blood for distribution than is actually required, and beats more slowly until the *status quo* is regained. It may be, too, that the infrequency of septic complications in these cases is explained by the engorgement of the circulation reducing absorption to a minimum. I would commend this subject to the careful consideration of maternity hospital residents, and others, whose opportunities for exact and frequent observations are so much greater than my own.

Puerperal Sepsis.

It is pathetic, in reviewing the medical journals of the past ten years even, to note the elaborate attempts at the classification of puerperal fever. As late as June 1894, the *Lancet* reports a discussion at the Royal Academy of Medicine of Ireland, on the etiology, prevention, and treatment of puerperal fever or septicæmia. It was introduced by a gynæcologist of world-wide reputation, and in the course of his remarks, he spoke of the epidemic diffusion and local prevalence of puerperal septicæmia due to air-borne "germs," much as if he were discussing a disease of the nature of measles or scarlet fever. I venture to say that no ordinary practitioner to-day, who makes claim to the modern point of view, would for a moment think of sheltering behind a proposition such as this. To-day we acknowledge, not without fear and trembling, that sepsis occurring in a healthy woman during the puerperium, is due to some error on the part of her attendants.

But not only has the old complicated view of these conditions failed to lay the blame on the right shoulders, it has also created a paralysing amount of needless alarm. I have had, I regret to say, several cases of sepsis in

my series of seven hundred, the most serious of which I reported at some length to the Victorian Medical Society; but they have all without exception yielded to treatment. I attribute this to the simplification of the situation in my own mind. For all practical purposes, puerperal fever, so-called, has resolved itself into secondary infection of retained membrane, placenta, or clot, or of vaginal or uterine laceration.

Of true septicæmia or systemic infection occurring at the time of the confinement, I can only recall one case, which was attended by a midwife, and to which I was called subsequently.

As soon as I am persuaded of the existence of sepsis, I at once give an intra-uterine douche of warm carbolic or lysol solution, If, after repetition of this no improvement takes place, I proceed to curette. I have quite ceased to regard elaborate warnings against primary curettage during the puerperium. I am fully persuaded of the immediate necessity for an early and thorough toilet of the parturient canal, and the removal of all infectious material. My statistics are not complete upon this point, but, so far as I can find, a morbidity even as high as 10 per cent. has not carried with it more than a 1 per cent. necessity for curettage, using the term morbidity to denote, as in the Rotunda statistics, all cases in which the temperature has once risen above 100·8°.

As to the wisdom of curetting when secondary endemetritis has become established, I am not prepared to express an opinion; that is another and much more difficult question. The academic discussion of puerperal sepsis, especially from the side of bacteriology, has created such a maze of technicalities, that amid the bewildering profusion of deviations—sapræmic, toxæmic, and bacterial—the practical obstetrician is in danger of missing the straight path to the duty that lies before him.

A Plea for "Standard Details" in Midwifery.

It will be said that a series of seven hundred cases, without a death from sepsis, cannot be held to establish definite conclusions on such important questions as the use of the forceps, the management of the third stage, or even the proper treatment of sepsis itself. Since this paper was prepared, however, a record in every way better, of over nine hundred cases with one maternal death, has been read by Dr. W. B. Walsh, of Kew, before the Medical Society of Victoria, and it would seem that it is only by the careful collation of more and more exact records that we can hope to approach finality on these points. They have been discussed *ad nauseam* and *ad infinitum*, but without appreciable advance towards certainty. Some definite pronouncement is imperative. While the profession hesitates, women die, because the onus of decision, day by day, and in the weary watches of the night, is laid upon the individual practitioner.

In engineering, I am told, certain details of construction are taken for granted by designer and builder, which greatly facilitate the work of each. These are known as "standard." Now, while it is not machines we have to consider, yet parturition is a process sufficiently true to type, in power, mechanism, and result, to admit of certain definite generalisations; and I am convinced that the efficiency and safety of our practice would be greatly enhanced by the enunciation of "standard details" in midwifery. The standardisation of surgical technique, while still leaving scope for the initiative and skill of the brilliant operator, has led to a notable improvement in general results, and a not less notable increase in public confidence. And obstetrics will not be brought into line with this advance, until some such unanimity has been attained. We all deplore the maintenance of the high death-rate in private practice from a preventable cause, such as puerperal sepsis. But no sensible improvement can be looked for until we leave the shifting sands of individual experiment for the sure standing ground of collective experience.

NOTES ON PUERPERAL SAPRÆMIA AND SEPTICÆMIA.

BY

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I REGRET that pressure of other work has prevented the completion of a paper which I have had in course of preparation for this Congress, and has necessitated the substitution, at the last moment, of a subject which I can but imperfectly deal with in the short space of time now at my disposal, but which. I trust, may prove acceptable to the members of this Section. At any rate, the subject now chosen cannot fail, I think, to be of interest to all general practitioners.

We all admit, I presume, that sapræmia results from the absorption of the products of decomposition, this decomposition being brought about by the action of saprophytic organisms on dead organic matter, such as blood-clots or pieces of placenta and membranes, or necrosing patches. The chemical products, or ptomaines, generated by these saprophytes may set up a mere local inflammation, or be absorbed into the blood, and produce sapræmia. According to Jellet, late Assistant Master of the Rotunda Hospital, "The direct cause of sapræmia is the entrance of air laden with saprophytes into the vagina or uterus, or the extension upwards of an external decomposition. The former occurs, to some extent, in almost every confinement; but sapræmia does not result, unless there is dead matter left for the saprophytes to feed upon."

Most of us will agree with this statement of an up-to-date representative of a famous British school. I will note but one point, namely, "air laden with saprophytes," to which I will return later on.

If the sapræmic patient has remained long untreated, the saprophytes, which at first were only able to live on dead matter, such as bits of placenta and clots, will, by feeding on these, have gained in virulence, and so have become pyogenic, and capable of existing on living tissues. Then the result of their action on the uterus will be septic endometritis, which may be followed by parametritis, perimetritis, salpingitis, or general sepsis. It is thus that a sapræmia becomes a septicæmia. G. E. Herman, some years ago, in an interesting paper in the *British Medical Journal* (which unfortunately I cannot lay my hand on just now), clearly pointed out, how comparatively harmless organisms may become pathogenic under favourable conditions like the above.

As soon, then, as the sapræmic organisms, the saprophytes, have so changed their characters that they can multiply in the living tissues and the blood, they are capable of producing septicæmia, and whether they do so or not, depends on the number of organisms present, the promptitude of efficient treatment, and the resistance of the patient. Professor Sternberg found that large doses of sapræmic organisms injected into susceptible animals produced septicæmia, but that small doses did not do so. In his famous "Textbook of Bacteriology," he states that "a considerable number of saprophytic bacilli are pathogenic for small animals when injected into the circulation, or subcutaneously, or into a serous cavity, in considerable quantity—1 to 5 cubic centimetres or more—but fail to produce any appreciable effect when injected into the bodies of these animals in minute doses, and do not multiply in the blood to any considerable extent, although, in fatal cases, they may usually be recovered in cultures from the blood and tissues. These bacilli are pathogenic by reason of the ptomaines produced by them, or because of local inflammatory processes which they induce, or for both of these reasons combined. Some of them also, under certain circumstances, multiply in the blood, and thus give use to a septicæmia, as well as to a toxæmia, *e.g.*,

the colon bacillus of Escherich." Again, he states that "a strict division of pathogenic bacilli, which produce general blood-infection—septicæmia—and those which produce a fatal result owing to the production of toxic chemical substances, is not possible, for many pathogenic bacteria produce general infection when injected in comparatively large doses, and at the same time give rise to symptoms of toxæmia; or general infection may occur in animals of one species, and fatal toxæmia without septicæmia in those of another species.'

In regard to the results treatment, sapræmia, if promptly attended to, almost always ends in recovery; if neglected, death may occur from ptomaine poisoning, septic peritonitis, or pyæmia.

There is an important point, which I may refer to here, and that is: although streptococci and staphylococci are the commonest organisms found in septicæmia, their presence in the uterus does not necessarily produce septicæmia or pyæmia, for they may remain local in their action, causing only a septic endometritis, and not multiplying in the blood. This condition may be accompanied by a high febrile re-action, as was exemplified in one of my own cases of hydatid mole, reported some years ago in the *British Medical Journal.* Infection occurred, and Dr. Nelly, of this city, examined the uterine discharge at my request, and found almost a pure culture of the staphylococcus albus. With a blunt instrument I very gently curetted the uterine surface, and packed with iodoform gauze; but, for obvious reasons, did not inject the anti-streptococcus serum, then much in vogue. The patient rapidly recovered with the above treatment.

To return to the question of sapræmia, a recent statement by Whitridge Williams, Associate Professor of Obstetrics in the Johns Hopkins University, has much point at the present time. He says that "there is no doubt that the term (sapræmia) has been grossly abused, and that many cases have been included under it which are really due to infection with the ordinary pyogenic organisms, and at the present time we are hardly justified in considering a case as sapræmic unless the lochia have been examined bacteriologically and found free from pyogenic organisms."

This statement is strongly supported by other distinguished bacteriologists. Bumm, for instance, found streptococci in eight out of eleven cases which were clinically designated as sapræmic, and Von Franque says that "sapræmic fever in the puerperium is extremely rare, and it should only be diagnosed when an accurate biological examination of the uterine lochia has demonstrated the absence of pathogenic, and the presence of saprophytic organisms." It may be added that there is a great variety of these putrefective organisms, which are mostly anaerobic, difficult to cultivate, and practically unknown in many of their main characteristics.

Now a few words may be said on the question of septicæmia. Septicæmia means *general* blood-infection, and it can, under no circumstances, be purely local. To produce this condition, it is essential that living bacteria enter the blood, and multiply therein. They should be found alive in the blood, and grown upon suitable culture media. Practically, it may be said that the ordinary organisms of suppuration are the efficient causes of puerperal septicæmia. Hence, puerperal infection means wound-infection. It is only of late years that the organisms concerned in puerperal septicæmia have been carefully examined. All recent investigations, however, go to prove that the streptococcus pyogenes stands in the front rank as the *fons et origo mali.* But staphylococci have also been demonstrated as the cause of the disease. Krönig found the gonococcus in 50 out of 179 cases of puerperal fever. Infection from this cause is said to be mild in character. The colon bacillus is proving to be a commoner cause of infection than was previously demonstrated. I have seen two fatal cases from this cause. When there is a mixed infection of colon bacilli and strepococci, the infection is probably more virulent than with either alone. Haultain, I think, is of this opinion, from

direct observation. Considering the apalling number of colon bacilli in fœces, the wonder is that infection from this cause is not more frequent. A good example of *local* infection by this organism came under my care at the Women's Hospital some years ago. The patient suffered from a recto-vaginal fistula after her first confinement. She had an easy delivery of her second child at the hospital. But a day or two subsequently, her temperature rapidly rose to 160°, with a rigor, owing to the bowel contents, which were somewhat watery, entering the vagina. As soon as this was washed out, and carefully packed with iodoform gauze, the patient improved. The gauze-packing was frequently repeated during the puerperium, till the patient's recovery at no distant period. A few cases of infection by the true diphtheria bacillus, as I stated in my last communication to the Medical Congress, have been demonstrated bacteriologically. Frænkel's pneumococcus and Welch's gas bacillus are occasional causes of infection. But, as an example of mixed infection, a case admitted to the Johns Hopkins Hospital would be hard to beat. In this case, the findings were streptococcus, staphylococcus aureus, typhoid bacillus, and an unknown anaerobic gas-producing bacillus. Cases may be due to other unclassified organisms.

Now, as to etiology, some recent writers assert that every case of puerperal infection is due to the introduction of pathogenic organisms by the doctor or the nurse. This is a very extreme view to take, and scarcely justified in the present incomplete state of our knowledge in regard to many of the organisms concerned. Grandin and Jarman maintain "that when puerperal sepsis develops, one or more of the attendants on the woman are culpable, even though the source or the manner of the infection cannot be determined." Jellet says that "lymphatic sepsis (acute septicæmia) in puerperal women is due to the inoculation of some part of the genital tract with streptococcus pyogenes, which has been introduced by the fingers or instruments of the medical attendant or nurse." This seems to me a most serious, and in many cases unjustifiable, charge to make. It appears, moreover, incompatible with his previous statement in regard to the etiology of sapræmia. He says that "saprophytic organisms are carried into the vagina or uterus, if air gains admission during or subsequent to the third stage of labour." And "the direct cause of sapræmia is the entrance of air laden with saprophytes into the vagina or uterus, or the extension upwards of an external decomposition. Now, if saprophytes can enter through the air, what is to prevent pyogenic organisms from occasionally entering through the same medium?

An enormous number of observations have of late years been made to determine whether the vaginal secretion is free from pyogenic organisms or not, and the results have been most contradictory, probably because of the differences in the methods of collecting the secretion used for examination. The consensus of opinion, however, inclines to the view that the vagina is free from pyogenic organisms. But practical surgeons have discovered that, as it is impossible to absolutely sterilise the skin, it is still more difficult to sterilise the vagina.

We know, moreover, that the vaginal secretion of many apparently healthy women is far from being in a normal state just before labour. Whence, for instance, comes the acute ophthalmia of the new-born infant? Was the germ causing this condition introduced into the mother's vagina on the finger of the doctor or the nurse I think it will be readily admitted that there is at least one more probable source of infection. What, then, becomes of the question of the culpability of the doctor or the nurse?

Moreover, the uterus itself may become infected from an inflamed tubal appendage, complicating pregnancy.

I have a patient who has a dilated tube on the left side. I have attended her in two or three miscarriages and two confinements. I have taken extraordinary precautions, in her case, to prevent infection, yet more or less

septic trouble has arisen on each occasion. Short of removing the tube, I would be glad to know how this could be prevented.

Then again, what about the development of sapræmia in association with a dead fœtus in the uterus? And have not the up-to-date bacteriologists associated with midwifery hospitals told us that sapræmia is "extremely rare in the puerperal state," and that many cases clinically diagnosed as such were bacteriologically dependent on streptococci?"

While I am a firm believer in the dictum that, in the majority of cases, puerperal infection means contact-infection, I should like to see it demonstrated scientifically that air-infection is or is not possible. Garrigues, in the "American Textbook of Obstetrics," states emphatically that it is possible from the foul emanations of sewers, or of dead animal matter, within a limited range. A large number of able writers agree with this opinion, but a larger host absolutely oppose it. What is the opinion of this Section?

To sum up the difference between sapræmia and septicæmia may be stated in this form:—

Sapræmia: absorption of *chemical products* of putrefactive organisms.

Septicæmia: absorption and multiplication in the blood of pathogenic *organisms* themselves.

In some cases *virulent* putrefactive organisms may multiply in the blood, and produce septicæmia.

The intensity of the symptoms produced depends on the seat of infection, the dose (number), and especially the virulence of the germs involved, and the resisting power of the patient.

I have dealt with but a few of the practical points that suggest themselves.

Discussion.

Dr. E. A. Mackay's paper on "Symphysiotomy," Dr. A. Osburn Cowen's paper on "Analysis of 700 Confinement Cases," and Dr. Nyulasy's paper on "Sapræmia and Septicæmia," were discussed together.

Dr. Webb (Victoria): After examining 1000 cases, my forceps percentage is 17, or 1 in 6. In the first 500, percentage was 22·5; in the second 500, 11·75. Variability in the type of patient may account for this. In forceps-delivered children, intracranial hæmorrhage has been found *post-mortem*. The after-history of forceps-delivered children would be interesting. I use the Neville forceps. The use of forceps for purposes of rotation is undesirable, but attempts at manual rotation should be encouraged. Abdominal examination is exceedingly useful; occipito posterior positions should be easily diagnosed thereby; our necessity for vaginal examination lessened. I do not agree with Dr. Cowen when he says that the condition of the maternal soft parts is of more importance. As regards symphysiotomy, Dr. Mackay has not shown sufficient reason for the employment of the subcutaneous method. The open method is advantageous, as it offers opportunity for tying vessels and wiring.

Dr. J. A. G. Hamilton (Adelaide): In symphysiotomy the children are often very large; the pelvic measurement is not always the most important. Many cases would be better delivered by Cæsarean section; it is much preferable to perforation. More room is obtained in doing symphysiotomy by stripping off tendinous edge off bone. I do not see the necessity for wiring the ends of pubes. I have seen two cases of spontaneous separation, which got well without surgical means (*e.g.*, tight bandaging). In another difficult case, while traction was being made by forceps, the assistant's finger was nipped by separate pubic ends. In this instance the child was very large. As regards Crede's method, it is better, in the absence of hæmorrhage, to wait for a normal detachment of the placenta. After waiting ten minutes, the

uterus may be stimulated by gentle kneading. Curetting should not be lightly undertaken in septicæmic conditions; a blunt curette should be used, with free washing.

Dr. Rothwell Adams (Melbourne): Nine years ago I did the first case of symphysiotomy in Australia. The pelvic deformity was not very great, but the patient had had two craniotomies before. I proceeded by the open method; the bleeding was enormous. I divided the pelvis with a bistoury; the bladder was easily separated from the pubes. Sudden springing apart of pubic bone should be guarded against by compression with a strong towel. The bones eventually united without wiring. After the patient's sudden death, three years after, post-mortem examination revealed a close fibrous union between the separated pubic ends. The operation is of limited applicability, and is not by any means so easy as described. As regards the midwifery paper, eclampsia should be watched for by weekly examination of urine for the last two months of the pregnancy, and necessary precautions should be taken. Eclampsia is more usual in patients with little œdema. The treatment should be restricted diet and warm baths in all suspicious cases As regards occipito posterior positions, soft parts of the mother rarely offer serious resistance. Abdominal examination should be made early. As the head often rotates on the floor of the pelvis, it is well not to try manual or instrumental rotation too early. Of the two manual rotation is by far preferable. The management of the third stage is most important; nature's method should be followed. No definite standard as to time can be laid down. If there is oozing from a flabby uterus, the uterus should be stimulated. Hæmostasis is the chief point to be aimed at.

Dr. Martin (Victoria): My own forceps cases much resemble Dr. Cowen's in their incidence. There is a large number amongst primiparæ; subsequently these patients are attended by midwives. I do not advocate the removal of the forceps when the head is on the perineum; their removal does not lessen the bulk. Laceration can be better guarded against by leaving forceps on. I do not consider the use of soap and water and a nail-brush as sufficient precaution; some antiseptic should be used. Nor do I approve of the introduction of the hand for the removal of the placenta; I can only recollect about three cases in 2000 where this was necessary.

Dr. Horne (Melbourne): I have used anti-streptococcus serum four times, with recovery of patient in each instance; but saline solution should be freely used as well. I have tried both forceps and manual rotation in occipito posterior cases, but am not well satisfied with either. My forceps percentage is about 1 in 10, but I never apply them unless absolutely necessary.

Dr. Taylor Young (Sydney): I saw anti-streptococcus serum used in Vienna, but it proved useless, after much trial. The cases that are serious are not beneficially affected by the serum. The nurse should be instructed not to touch the vagina.

Dr. Wade (New South Wales): Two years ago I used the serum in 10 c.c. doses for a patient with a temperature of 106°; she recovered. In another case of removal of adherent placenta I used the serum; cut also a blunt flushing curette; the patient recovered. In a third case I used it, but without beneficial result. Here there was a slight perineal tear. In two days there was pronounced septicæmia. The serum reduced the temperature from 106° to 103°, then to 99°; the pulse rate to 80 from 140; and the respiration to 20 from 72. I used all other means; the patient had every nursing advantage, but succumbed on the twenty-second day.

Dr. Walker (Port Pirie): In my opinion, traction and compression of the head by forceps should be relaxed during the intervals. Perineum may frequently be saved by attaching a piece of sticking-plaster to the distended perineum.

The President: Symphysiotomy is not a desirable operation, as it leads to lameness; premature induction of labour is to be preferred. As regards asepsis and antisepsis, apply asepsis as regards the woman, and antisepsis as regards the doctor. All precautions necessary for an abdominal section should be taken. Abdominal palpation is of much importance. Bimanual version is also of much use. If eclampsia threatens, it is advisable not to wait, but to induce labour; it is much more difficult to induce labour once eclampsia has developed. Axis-traction forceps are most useful, but do not remove forceps until child is born. In sepsis, careful curetting should be employed early; saline solutions (in quantity up to 2 quarts) injected are of much service. I have not seen any favourable results from the use of serum.

Dr. Mackay, in replying to criticism, said: Those who advocate the open method as opposed to the subcutaneous, have, I think, been misled by the use of the term subcutaneous. It would be better to term the two operations direct and indirect, instead of open and subcutaneous. The so-called subcutaneous method is only subcutaneous in so far as the symphysis is not directly exposed—an incision 3 inches in length in the mid-line of the abdomen at its lower part enables the operator not only to get a clear view of the symphysis, but to get one's finger behind the symphysis—and, as it avoids wounding tissues where hæmorrhage is very hard to control, it is the better operation. As to the statement that labour induced at the seventh month, with delivery by podalic version, was the proper treatment, in a case with a true conjugate of $3\frac{3}{4}$ inches, I agree that that would be so, had the transverse and oblique diameters been of normal dimensions, but they were diminished, and the history of former labours showed, that labour induced at the seventh month, and completed by podalic version, had failed to produce a viable child, though carried out by one of the most skilled obstetricians of the Melbourne Women's Hospital, while labour induced at the eighth month had resulted in craniotomy having to be performed. I believe the bad result as regards locomotion was due to lack of keeping the pelvis bound up tightly enough, and it seems to show that the operation is not a suitable one in very fat patients. Unsatisfactory as this case was, there was the great reward of a living child at full term, and the improvement in locomotion, though so very long delayed, shows we should never despair of recovery.

Dr. Cowen, in reply, thanked members for the generous reception they had accorded his paper. He congratulated Dr. Webb on his statistics regarding forceps delivery.

Replying to Dr. Webb and Dr. Adams regarding abdominal palpation, his remarks had been misunderstood. What he had intended to convey was that, as in 90 per cent. of cases the position was normal, there only remained the condition of the maternal soft parts to be considered, and it was on this account that he was of opinion that abdominal palpation could not replace vaginal examination. He had made no statement as to the condition of the soft parts retarding delivery.

In reply to Dr. Hamilton, he only wished to say that he had been careful to differentiate between primary and secondary curettage during the puerperium, and in his hands the former had proved a satisfactory procedure.

In reply to Dr. Worrall, he aimed at asepsis for himself, because it was attainable, but was limited to antisepsis for his patient, because strict asepsis was unattainable. He had some difficulty in appreciating Dr. Worrall's objection to the statement, as antisepsis was only on the way to the true goal, asepsis.

With reference to Dr. Adams' objection to a time limit in the third stage, some definite minimum would, he was convinced, be of general advantage. He was of opinion that an overwhelming percentage of placentæ, which did not respond to expression, at the end of half an hour would be found to be genuinely adherent.

PUBLIC HEALTH.

Presidential Address.

THE ETIOLOGY OF TYPHOID FEVER.

BY

Thomas Cherry, M.D., M.S., Lecturer on Bacteriology, the University of Melbourne,

No apology need be made for choosing this as the subject of an address before the Congress in the Section of Public Health. Typhoid fever shares with tuberculosis and cancer the distinction of being the most important of diseases throughout Australasia. The deaths for the Commonwealth and New Zealand were as follows for the three years 1896-7-8 :—

Phthisis	11,990 = 9·27	per 10,000 per annum.
Malignant Disease	7268 = 5·62	,, ,,
Typhoid Fever	4796 = 3·71	,, ,,
Diarrhœa	7784 = 6·06	,, ,,

Not only is typhoid fever important from the actual number of deaths, but it differs from the other two diseases in carrying off the individual at the time when he is of most value to the community. Tubercle falls largely on the weak, and cancer on the aged, but typhoid selects the young and vigorous, just when their powers have arrived at maturity.

That the causation of the disease is very closely connected with the presence of the typhoid bacillus in the intestinal canal and internal organs of the patient is beyond doubt or question, and this point being conceded, typhoid becomes a member of that group of diseases, the bacteriology of which is fairly well known. The most important of these are diphtheria, cholera, tuberculosis, septic diseases, plague, and anthrax. Now, these diseases differ from all others in this respect. The word *contagious*, when applied to them, has a new and specific meaning. In their case, the *contagium* has ceased to be an idea, and has become an actual fact. It is no longer a mysterious effluence, but a definite thing; infinitesimal it may be in size, but potent, because alive and capable of growing in living tissues. It does not pass from patient to patient like a capricious demon without making use of the physical surroundings, but it is transferred by some definite and ascertainable channel, and hence it is avoidable. It is no longer contagious in the old sense of the word, viz., that simple proximity is capable of conferring the disease. We know, now, that in all these cases we can touch and handle the patient without danger, and if we could educate the community to live up to even our present state of knowledge, all these diseases would appear in the course of a single generation.

Let me glance for a moment at some of the ways in which the new knowledge has altered our relation to two or three of these diseases. In the case of diphtheria, we know the bacillus which causes the disease, and its toxin which causes the symptoms. As the disease progresses, the antitoxin gradually appears in the blood, and if the patient recovers, this—the natural antitode—completely neutralises the toxin. Had we any means of ascertaining the exact amount of toxin in the blood at any moment, we could calculate the amount of antitoxin necessary to destroy it, with the same accuracy as we can calculate the weight of alkali necessary to neutralise a

given quantity of acid. The spread of this disease may be explained, without assuming that the bacilli get into the air or water, and without invoking the assistance of insanitary surroundings. In the vast majority of cases, all the evidence goes to show that they are transferred, directly or indirectly, by means of the saliva, and the incidence of the disease depends on the manners and customs of the people. Children, for instance, both at school and at home, are continually putting things in their mouths, and one may readily see how easily a transference of the bacterial flora of the mouth may take place. Moreover, many cases of obscure origin are explained by the discovery that diphtheria may exist for months in the chronic form, and still be highly infectious.

Speaking generally, septicæmia, malaria, anthrax, and the plague differ from diphtheria in the fact that their respective organisms require to be not merely implanted on the surface of a mucous membrane, but actually inoculated into the deeper tissues. Such inoculation is no casual event, but is brought about in a few simple and recognisable ways. The incidence of three of them has been explained by observations on the relation of micro-organisms to the lower animals, and the part which insects play in the spread of the disease. In the case of septicæmia, we are warranted in saying that, while auto-infection may not be unknown, nearly every case is due to the transference of the pyogenic organisms, directly or indirectly, from another patient. The experience of twenty-five years has shown that when a series of such cases occurs, there is something wrong with the professional or nursing staff, and the cure for it is not to close the building, but to overhaul the technique in vogue. An equally striking example of the results of the new knowledge is seen in the history of tuberculosis in most European countries. In England, for instance, the death-rate for the years 1891-97 are reduced 31 per cent. in males, and 42 per cent. in females, as compared with the ten years 1861-70. No improvement in the general well-being and hygienic condition of the people would have brought about these results if the controversies as to the nature of tuberculosis had not been closed by Koch's discovery of the bacillus. It will be seen that in each of these diseases it is not necessary to know the life-history of the respective organisms in all its phases. Break the chain at any one point and we are masters of the situation. We no longer require to hypothecate vague atmospheric or telluric influences. We are able to say at once that if certain definite things are done, the disease will cease to spread, and our confidence in the strength of this position is more than justified by the experience of each succeeding year.

Let us see how far we can apply these principles to typhoid fever. The bacillus was discovered in 1880 by Eberth ([1]) in the early days of bacteriology, and probably no single organism has received a larger share of attention from investigators ever since. Yet the further we proceed with the investigation, the more complicated and difficult the problem becomes, so that advancing knowledge, instead of clearing everything up, seems, for the time at least, to have simply upset old ideas and created confusion—the darkness, let us hope, before the dawn. I need not enter into any detailed description of the bacillus, merely remarking that the first difficulty to be encountered arises from the fact that typhoid is not readily transmissible to any of the lower animals, and that when they do succumb to the action of the bacilli, the effects are more septicæmic than is generally seen in man. Hence, many of the facts established by experiment can only be applied to human beings by inference, and no use can be made of animals, to separate typhoid from a mixture of organisms, as can be done with anthrax, diphtheria, plague, and tubercle. Even the discovery of the special reaction towards the bacillus

([1]) Eberth, Virchow's Archiv., Bd. LXXXI., 1880.
Gaffky, Mitth. a. d. K. Gesundheitamte, Bd. II., 1884.

which is acquired by the serum of an animal or human being infected with the organism, has not cleared up all the difficulties in the way of recognising the bacillus. It may be said that when an unknown serum causes a culture of the typhoid bacillus to agglutinate at a dilution of 1 in 50, it is practically certain that such a serum comes from a typhoid patient; but it by no means follows that when an unknown bacillus is affected by typhoid serum, at a dilution of 1 in 200, this bacillus is the typhoid organism. Indeed, organisms of the colon group have been isolated from typhoid stools which have reacted at dilutions of 1 in 10,000.

In the fæces of man and the higher animals there exists an organism, the bacillus coli communis, which is the commonest and most characteristic of the intestinal bacteria. It is so common that it usually forms from 5 to 10 per cent. of the total number of organisms found in sewage. The original habitat of the colon bacillus is, I believe, the soil; but it possesses two attributes which enable it to live in the animal body. These are—the ability to grow readily at blood temperature, and also to flourish in the presence of a small percentage of carbolic acid. Hence, it has become the permanent denizen of the alimentary canal. Now, the colon and typhoid organisms have so many points in common, that the two are regarded as members of the same group of bacteria. One of the marked characteristics of the group is the extent to which variation takes place among the descendants of a single bacterial cell. The theories of Darwin and Weissmann about the variation of species in animals, and the transmission of acquired characters, have been elucidated but little by experiment, because the germ plasm is comparatively safe from external influences hidden away deep in the recesses of the body. But with bacteria the case is different. Their protoplasm is exposed and naked, and all parts are equally concerned in the function of reproduction. Specialisation of function scarcely exists. The consequence is that all bacteria tend to vary, and in the colon group this tendency is very marked. This is seen in the following example:—A pure culture of colon bacilli isolated from water yielded ten sub-cultures, each growing presumably from a single bacillus, which agreed in all reactions except the quantity of indol produced in the same sample of broth. A second series of sub-cultures made in the same way from one of the first, differed among themselves not only in the amount of indol they produced, but also in the quantity of acid and in their reaction towards milk, five producing coagulation and five not. A third series of sub-cultures from a colony of the second series varied not only in both the above particulars, but also in the production of gas in media containing glucose, eight producing gas and two not.

In dealing with the relationship of the typhoid and colon organisms, there are about a dozen tests by means of which the typical bacilli may be distinguished from one another. But the gap between the two is completely bridged over by a series of intermediate forms, some of which agree with the colon in eleven, and with typhoid in one; others with colon in ten, and with typhoid in two, and so on; until we find some which agree with typhoid in ten, and with colon in two; and finally with typhoid in eleven, and with colon in the remaining one. Nearly intermediate between the two is the *B. enteriditis*, or Gärtner's bacillus, pathogenic organisms first found in cases of meat-poisoning. The sub-cultures of this bacillus are markedly variable in such reactions as the production of gas, the growth on potato, and the way in which they are agglutinated by typhoid serum, in some cases reacting at dilutions of 1 in 10,000. This organism has also been found in pure cultures in patients suffering from apparently typical attacks of typhoid fever. Schottmüller (2) reports six cases, all of which recovered—two of them mild attacks, three of medium severity, and one a severe attack. In each case, twenty cubic centimetres of blood were drawn. and the whole of

(2) Zeit. f Hygiene, 1901, XXXVI., 368.

it sown on large plates of agar. All the resulting colonies were carefully examined, and proved without exception to be those of Gärtner's bacillus. Another striking case is reported from the Johns Hopkins Hospital.(3) Nine months before admission the patient had suffered from a severe but typical attack, apparently of typhoid fever, lasting, with relapses, for ten weeks. A chronic abscess formed over one of the costo-chondral articulations, and when the cavity was cleaned out in March, 1899, a pure culture of Gärtner's bacillus was found in the *débris*.

In nearly all fatal cases of typhoid, a pure culture of Eberth's bacillus may be obtained from the spleen, but some cases have been noted in which the typical organism could not be found. In every case of typhoid fever, many of the colonies of colon bacilli, isolated from the spleen or intestine, are markedly atypical, and the variations incline in the direction of Eberth's bacillus. On the other hand, organisms very closely resembling the typical typhoid of Eberth have been found in healthy human fæces, and in the intestine of the dog; (4) while one species, the *B. Fæcalis alkaligenes*, (5) which appears to be not uncomon in human fæces, is distinguished from the typical typhoid only by the amount of alkali it produces, and by developing a slightly more deeply-coloured growth on potato. It reacts to typhoid serum in fairly-high dilutions. Finally, Sacquépee (6) claims to have transformed the typical typhoid bacillus into the intermediate forms and *vice versâ*. All observers are agreed that, when two organisms are growing together, the characters of both are modified, and that the simultaneous injection of typhoid and colon bacilli leads to an increase of virulence of both. While the identification of Eberth's bacillus, and indeed the whole bacteriology of typhoid fever, seems to be thus in a condition of uncertainty, much of the work concerning the identification of other bacterial species is in the same state. The inherent power of variation, and the artificial conditions under which they are cultivated, give rise to difficulties in arriving at a standard of uniformity, which have been recognised, but not yet overcome.

Many cases are on record which go to show the long periods of time that typhoid bacilli can exist without causing symptoms. They have been found in the urine several months after complete convalescence. In the gall-bladder they can exist in pure culture for years, and the post-typhoid abscesses, in which they are generally found in pure culture, may appear months, or even years, after the acute attack. Experiments seem to show that the bacilli will exist in water, sewage and soil only for two or three months, but it is quite possible that these results are due to imperfect methods for finding the organism.

All recent work tends to show that many mild cases of fever, often classed as febricula, are really typhoid, and may be the unsuspected means of spreading the disease, just as mild attacks of nasal catarrh are some times due to the diphtheria bacillus, and may spread the virulent disease among susceptible children. It is quite possible also that clinical typhoid fever is a composite disease caused by a number of closely allied but distinct and separate micro-organisms.

Turning now to the great facts which have been ascertained independently of bacteriological research, typhoid fever appears to have been at all times a disease of world-wide distribution, occurring in sporadic cases or in epidemics, the contagium being contained in the alvine discharges—"that in very few cases is there any evidence of direct contagion from the sick to the healthy. In a considerable number of cases, especially of isolated cases, no

(3) Harvey Cushing, *Bull Johns Hopkins Hospital*, XI., 1900.
(4) Lembke, Arch. f. Hygiene, XXVII., 384; XXIX, 304.
Cushing and Livingood, "Contributed by pupils of Dr. W. H. Welch," p. 570.
(5) Petruschky, Cent. f. Bakt., XIX., 187.
(6) Annales de l' Inst. Past., XV., 249.

direct or indirect contagion can be found. In a large number of cases, especially in large epidemics, the disease arises among persons who drink unfiltered and unboiled water or milk contaminated with typhoid stools." (7) The direct evidence as to the mode of entry into the body is scanty. In one or two early cases, masses of typhoid bacilli have been found in the mucous, sub-mucous and muscular coats of the intestine (Klebs); but unfortunately these observations were made at a time when the intermediate forms were not well distinguished from Eberth's bacillus, and hence some doubt exists as to whether they were genuine typhoid bacilli. A recent analysis by Schüder, (8) of 650 epidemics occurring chiefly in Germany and England, gives the following results:—

462	epidemics were	due to	water;
110	,,	,,	milk;
23	,,	,,	other food stuffs;
12	,,	,,	clothing or bedding;
43	,,	,,	all other causes.

His review of all the statistics available at the present time bears out the opinion that the disease is very rarely transferred direct from one person to another.

While there can be no question as to the origin of the great majority of epidemics of the disease, there is often difficulty in accounting for isolated cases. Some of these are so peculiar, that we must either assume that the bacillus can exist in a virulent form in water or soil for several years, or else that the colon organisms in the intestine become transformed into typhoid, or, at all events, into the intermediate forms, and thus the disease arises *de novo*, as Murchison taught. Take, for instance, the following case reported by Dr. Metcalf. (9)

In Norfolk Island, lying 1100 miles from both New South Wales and New Zealand, there was, in 1868, an epidemic of some kind of fever. No further cases occurred till 1877, when a man was reported to have died of fever; but the exact nature of the disease is uncertain. In January, 1880, a typical case of typhoid occurred at the Mission Station, in a man who had arrived in the island in the previous September. He recovered after a fairly severe attack. On investigation, it was found that he was the only person in the island who drank the water from a well with a bad reputation. This well was 7 feet from an open drain, in which the waste water from the kitchens stagnated, and on being cleaned out it was found to be in a very filthy condition. All the latrines at the station were at a distance from the well, and much lower down the hill. Dr. Metcalf says there are only two hypotheses possible—either the patient carried the contagion with him for fifteen months (since he left England), or else the disease originated *de novo*. We may add three other suggestions, all very difficult of acceptance—(1) The typhoid bacillus may have been in the polluted well for several years; (2) some of the islanders had been carrying it about in their bladders or intestines for a similar period; or (3) the attack was caused by Gärtner's bacillus, which existed in the well.

Take, again, the case of the equally isolated island of Ascension, lying in the Atlantic 800 miles north of St. Helena. Dr. Maclean (10) says that during the years 1878-80, cases of the disease occurred from time to time without any discernible connection with each other, usually in new arrivals. "If enteric fever, according to the currently-accepted theory of its origin, is always associated with defective sanitary arrangements, then, Ascension, of all places with which I am acquainted, ought to be exempt from it. There is no such thing as a sewage drain or cesspool in the island; all sewage and

(7) Dreschfeld in "Allbutt's System," I., 804.
(8) Zeit f. Hygiene, 1901, XXXVIII., 343.
(9) *British Medical Journal*, 1880, II., 740.
(10) *Lancet*, 1880, I., 859.

other filth being removed daily and thrown into the sea to the leeward of all dwelling-houses. The water, partly collected from the roofs of buildings during rains, and partly condensed, is stored in cemented stone, or iron tanks removed from all possible source of contamination. My investigations have utterly failed to connect the fever with any of the conditions commonly believed to be essential for its production."

The only explanation seems to me to consist of two pure hypotheses—that the tanks had been contaminated at some previous period; and that such water is capable of setting up the disease in a newcomer, but not in one who has become gradually habituated to the use of the water.

Dr. Sprott informs me of a somewhat similar series of cases which have just occurred in one family at a small seaside settlement at the southern end of D'Entrecasteaux Channel. The children had never left home, and the parents had not done so for years; while on the other hand no case of typhoid fever has ever occurred, so far as is known, in the neighbourhood.

Turning now to the large number of instances, both of isolated cases and of epidemics, quoted by Murchison, ([11]) and on which he founded his theory that the typhoid poison was contained in fermenting fæcal matter, whether this was derived from previous case of enteric or not, we find that what happened in most of his cases was as follows:—No changes whatever had occurred in the routine, except that something had gone wrong with the cesspit. It either began to leak through an abnormally dry summer cracking the ground, or else the outlet pipe became choked, and it began to overflow. In some way the thing became a nuisance, and it was cleaned out and repaired. Simultaneously with this, a series of cases of fever occurred among the inmates. We could explain most of these cases by assuming that the cesspit, being out of order, had allowed some of its contents to find their way into the water-supply. But, even so, we must further assume either that the organism of enteric fever can live for years in cesspits, or else that mild cases of the disease are of comparatively frequent occurrence, and are not usually recognised as such. Again, while the very severe epidemic among the troops in South Africa seems to have been almost entirely water-borne, and to be for the most part easily explicable on current theories, still the same does not hold good of other equally well-marked epidemics of recent times. In the American Civil War of 1861-66, many of the operations took place in well-watered forest country, where the rainfall was heavy, and creeks and rivers abundant. In the gold rush to the West Coast of New Zealand in 1864, large numbers of the cases admitted to the Hokitika Hospital were miners who had been working for months at the heads of lonely gullies in the dense scrub. The rainfall was incessant, and they were frequently working up to the waist in the water of the creek. Similar conditions as to the abundance of water prevail at the present moment at Klondyke in summer; in winter, everything is frozen hard, yet enteric fever is prevalent, as it usually is in a mining camp. Again, in Western Australia, during the past six years, the death-rate has risen to 25 per 10,000, or sixteen times the present rate in England. This epidemic has some features of special interest. Many of the cases can at once be explained by the recent contamination of water, and on the goldfields, where water is scarce, this has been emphasised by the fact that, when the rain does come, it washes all the dust from the iron roofs into the tanks. This dust, in the chief mining centres, frequently contains dried particles of human excreta, often, probably, from fever patients. The widespread contamination of the water-supply is thus explained, and I am informed by medical men in charge of hospitals that a good fall of rain is usually followed by a great increase in the number of cases in the townships. But, on the other hand, cases occurred in which a

([11]) "The Continued Fevers," 3rd Ed., p. 473, *et seq.*

small party had gone out on prospecting expeditions equipped with tinned provisions and a condenser.

Considering next the actual modes of conveyance of the bacilli to the patient, one or two facts may be mentioned. From what we know of the resistance of living tissues to invasion by micro-organisms, it is not likely that a single bacillus, however virulent, can set up disease. This is especially the case in the alimentary canal, where the epithelial cells are well accustomed to dealing with micro-organisms of all kinds, being, in fact, continually in contact with them. Hence, we must account for typhoid being conveyed in large numbers, the mass of substance being, perhaps, invisible to the naked eye, but yet containing many thousand, or even million, individual bacilli. These conditions are easily fulfilled in the case of milk. Here the bacilli grow rapidly in warm weather, and, provided six or eight hours have elapsed between contamination and consumption, the typhoid bacilli may number 10,000 per cubic centimetre, and still form only ·1 per cent. of the total number of organisms present. In the case of polluted water, I am inclined to think that infection is set up, not by drinking an odd bacillus, but by swallowing a tiny particle of fæcal matter containing great numbers of them. In ordinary unfiltered water, when a series of examinations is made, extending over long periods, it is found that an anomalous result occurs, perhaps once in three months. The number of organisms suddenly rises, say from 50 to 5000 per cubic centimetre, and next day assumes its normal figure. The explanation is, I think, to be found in the little particles of mud which are carried down by the creeks and held in suspension, and one or two of these happen to get on the cultivation plate on the particular day in question. Something similar must often happen in polluted water, little particles of solid materials being swallowed, and these containing large numbers of the specific bacilli. Further, more attention should be devoted to the way in which bacteria are distributed by flies and dust. If a fly be caught and allowed to walk over the surface of a plate of nutrient agar, its footsteps will, in the course of forty-eight hours, be marked by parallel rows of tiny colonies of bacilli, many of which prove, on examination, to be colon organisms. The fly itself probably deposited only one or two bacilli at each contact with the plate, but these rapidly multiply till, in the course of forty-eight hours or less, the colonies are as large as the heads of small pins. Similar facts hold good with regard to particles of dust. The fly obtains the colon organism on its feet simply because these bacilli are practically ubiquitous in the neighbourhood of human dwellings. I think that this goes far to explain the disappearance of typhoid fever as soon as an efficient system of drainage is introduced into places where it was rife before. Where cesspits and closet-pans are in use, flies have access to their contents. They may convey the bacteria direct from them to articles of food and drink, thus allowing, in some cases, a colony of the bacteria to be developed before the food is eaten; or they may convey them indirectly by alighting in the gutters and other damp places in the neighbourhood of a house. A trace of organic matter is enough to enable the typhoid bacilli to multiply, and thus the germs may be conveyed a distance from the original focus, and fresh contamination be distributed to water, milk, and food-stuffs. Once again, the disease may be spread directly or indirectly by the agencies of flies and dust.

Conclusions.

(1) Many mild cases of fever, often classed as febricula, are slight attacks of typhoid, and may serve to distribute the contagion.

(2) Typhoid fever itself may be a composite disease, or series of diseases, caused by closely-allied organisms.

(3) While, from the bacteriological evidence, the *de novo* origin of the disease is not disproved, still a general survey of all the known facts enables us to explain most cases without having recourse to this hypothesis.

(4) Typhoid fever at once disappears from a community with the introduction of a proper system of disposal of excrement and household refuse. In towns, this can best be done by a properly-constructed water-carriage system of sewerage.

(5) The disease is spread chiefly by the contamination of water, milk, and other articles of food. In hot countries, at least, flies and dust have a considerable share in bringing about this contamination.

(6) The length of time during which the bacilli can exist outside the body is unknown. There is evidence to show that the contagion hangs about old cesspits and contaminated soil for several years.

THE SPIRIT OF HYGEIA IN AUSTRALIA.

BY

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It is not an unusual practice, I believe, for authors of papers about to be read before Congress to preface their remarks with an apology, or at least with the frank confession that they contribute little or no original matter, and intend to give merely expressions of opinion for the purpose of inviting discussion. They sometimes assure the audience that old friends will be readily recognised in their papers, despite their up-to-date garments, and express a fear lest the nature, substance, and quality of the article contributed should not be in accordance with the demand and expectation of the assemblage. I approach my subject in a spirit of similar humility, and in the paper I have the honour to read before you to-day I shall endeavour only to cast reflective and suggestive thoughts upon matters treating with sanitary reform in this country, in regard both to the past and the future. I propose dealing with the question rather in its administrative and legislative aspects than otherwise, and my frame of mind is receptive, rather than dogmatic.

Sanitation as a study, if not as a science, was well understood and practised among some of the nations of antiquity. The Jews, the Greeks, and the Romans carried out to a remarkable degree the practical application of that branch of sanitary science known as hygiene. Hygeia, the Goddess of Health, was something more than a mere myth to the Greeks of the heroic age. The citizens of ancient Rome bestowed careful attention on their daily ablutions and toilettes, as well as upon the sewerage and drainage of their city. "A Treatise on Hygiene," by Moses, sounds rather paradoxical and ancient; yet that is what the "Book of Leviticus" really is. Its chapters on pure air, pure food, pure dwellings, and pure bodies furnish texts for the most modern treatise on hygiene to-day; yet it has taken the world upwards of two thousand years to fully understand the wisdom of that inspired and first sanitary code mentioned in history. In matters of public and domestic hygiene and practical sanitation some of the ancients were far ahead of the average Australian.

We profess to shudder when we look back upon what we are pleased to call the "insanitary past." Insanitary past, forsooth! Modern humanity has washed its body, but has not been able to purify its mind. Prejudice, apathy, ignorance, selfishness, vested interests, and prescriptive rights still exist as bars to sanitary progress, as in the days of old.

Plague, leprosy, cholera, smallpox, the pestilences of the middle ages, are, like the poor, still with us; but the modern science of bacteriology has invested them with the dignity of the order of "germs."

Our modern dwellings are still ill-ventilated and over-crowded; public and domestic water supplies are still polluted; food is still adulterated; chimneys still vomit black smoke and chemical fumes; drains and sewers are still badly constructed; governments are still apathetic, local authorities still indifferent, individuals still careless or ignorant of those simple laws of health and purifying observances practised in the days of Moses.

The spirit of sanitation decrees that man should no longer herd in caves; that the individual should no longer pollute the water he drinks, contaminate the air he breathes, adulterate the food he eats, or be insensible to the sanitary arrangements of the house he dwells in. Selfishness and the struggle for existence, the natural instinct to look after "Number

One," have forced the individual, formerly solicitous only of his own individual health, to recognise in his neighbour a possible source of danger to himself. He therefore looks to a paternal government for that protection which he imagines legislation is able to afford. As with individuals, so with a community, which is merely the sum of its individual members. The band of early sanitary reformers in England had to fight both political and municipal opposition to sanitary reform. Even that high-minded statesman, John Bright, and many other politicians, had to be forced to recognise that sanitary science was not a collection of fads and fancies, but that its principles had a distinct and important bearing on decency, morality, economy, and humanity. Sanitary matters and health questions have never received, and are not likely to receive, in Parliament the full measure of attention that they deserve. They promote no party object, bring in no revenue to the State, and are apt, therefore, to be thrust into the background in favour of more exciting topics. I do not mean to say that governments have not passed Health Acts on their own initiative, or that many politicians are not enlightened as to the great benefits to be derived from sanitary legislation; but I would point out that while sanitary reform is praised by politicians in the abstract it is not likely to enjoy its due meed of official sympathy until the people are enabled to appreciate, and thus led to demand, the laws relating to public health, and their stringent enforcement.

There is no sanitary reformer like an epidemic of some dread disease, such as plague or smallpox. The recent visitation of plague to the Australian States brought about a great sanitary awakening, both of the authorities and of the more intelligent citizens. On experience and education will depend the effective action of the people themselves in matters relating to sanitation. To abolish class legislation and party faction would be to abolish the system of government and the art of politics. The brave old days, "when none was for a party, but all were for the State," are seemingly dead. To me there seems an absurd as well as a humorous side to the government by parties in politics. At bottom these political controversies are simply wrangles among various classes as to their relative positions in society; but all parties can unite to procure healthful physical environment.

Gentlemen, we are gathered together at this Congress in one united party, for one common cause, and whatever discussion may take place, whatever differences of opinion may be expressed, the one, the only great principle, underlying all our controversies is the discovery of truth. "Nations," says Mr. Balfour, "may erect against each other some barrier of tariffs, they may engage in some absurd rivalry animated by I know not what sort of suicidal policy; but men of science, wherever they live, to whatever nation they belong, have a course common to humanity at large, which knows no provincial boundaries, which is not interfered with by any sectional rivalries."

It is conceivable that some day Parliament may, in health matters, follow our good example, for such a policy should of all policies be the most attractive to all political parties. Legislation on matters pertaining to the public health must necessarily be progressive, and therefore of a piecemeal character. It is impossible to frame once and for all a definite code of sanitary laws. The laws of the Commonwealth of Australia relating to public health are contained in the statutory enactments of the legislatures of the various States, the by-laws of the local authorities, and the regulations and orders of the various health authorities, in pursuance of powers in that behalf conferred by Parliament. The foundation of our various Health Acts is the Public Health Act of 1875 of England and

Wales. In enacting our statutes we must never lose sight of the fact that the conditions of life and the environment of the people in Australia are somewhat different to what exists in the Old Country. The sanitarian coming here from abroad will find that he has to work under much more difficult conditions than those with which he has become familiar in the progressive municipalities of the Old World, and he will soon discover also that apathy and ignoble self-interests have taken deep root in Young Australia.

Perhaps no statute in England has been more frequently amended or added to than the Public Health Act of England and Wales. "There is no branch of law in England," say Stevenson and Murphy in their treatise on "Hygiene and Public Health," "with which it is more desirable that the public should be intimately acquainted, or with respect to which more general ignorance prevails." Health Acts are professedly passed in the interests of the general public, but they are frequently drafted in such a manner that only the members of the legal profession can interpret them. The lay mind does not at any time, even with the best-drawn Act of Parliament, easily grasp the verbosity of legal phraseology, and it seems to me that the sections of many of our Health Acts could be thrown into a simpler and less complex form, which, while preserving their strict and definite legal meaning, might also be readily understood by the general public. The Health Act of 1890, of Victoria, is perhaps the most consolidating and voluminous of our laws relating to the public health; yet it is the most involved and confusing in its long, unpunctuated sections. There is a brevity, a simplicity, and a directness of purpose in the South Australian Act of 1899, which is most admirable "in these days of clauses so constructed that a clever advocate can prove that they mean anything, including sometimes what they were intended to mean."

However good and wise legislation may be, it is of little service unless it can be backed by equally effective administration. In fact, it is administration rather than legislation which is at default. An old report of the Sanitary Commissioners states:—"The system of self-government, of which the English nation is so justly proud, can hardly be applied with success to any subject, unless the governing bodies comprise a fair proportion of enlightened and well-informed minds; and if this be true as a general proposition, it is especially true in regard to matters affecting public health."

It may be argued that sanitary work is largely scientific, and that our local councillors are business men, who have not the time to study questions involving the application of common-sense business knowledge to technical questions; but it may also be argued that men who have not the time or mental capacity to grasp the vital importance of preserving the public health, and the requisite scientific methods, have no business to be members of the local governing body, unless they are willing to be guided by those who, by virtue of their position and duties, are in the best position to judge. Local authorities have too little or too much responsibility in the administration of sanitary matters. Since the establishment of the Commonwealth there is a tendency on the part of the State Governments to reserve to themselves many departments which were formerly under the control of the local authorities. To some extent municipal authorities have only themselves to blame if Parliament be unwilling to delegate its powers to them. Until there is a keener interest in municipal affairs, until younger men are fired with the ambition of doing for their city what the Right Hon. Joseph Chamberlain has done for Birmingham, what Lord Rosebery has done for London, and what Sir James Graham has done for Sydney, no solid advance in sanitation is possible.

The Health Act of 1900, of Queensland, throws upon each local authority the responsibility of protecting the public health of its own district. It further provides for hospital accommodation and isolation of infectious diseases, and indicates to local authorities, more especially to those of districts of small or moderate size, the means by which they may advantageously make such provision, viz., Section 117 provides that the local authority may and shall, if required by the Commissioner by order so to do, provide hospitals or temporary places for the reception of persons in the area affected with infectious disease, and for that purpose may erect, maintain, and manage such hospitals, or contract for use of any such hospitals, or enter into an agreement with any person or body having the management of any hospital, &c. Section 120 gives power to two or more local authorities to combine for the purposes of the Act relating to the prevention of infectious disease. Some twenty local authorities within a radius of twelve miles of Brisbane have combined under this section to form what is known as the "Metropolitan Joint Board for the Prevention of Infectious Disease." This Board, composed of representatives of the various local authorities, has the power of a local authority for the purposes of Part VII. of our Health Act dealing with infectious diseases, over the whole area comprised by the various local authorities. It is subsidised by the State to the extent of £1 for £1 on the amount raised by precepts levied on the local authorities represented on the Board. It is the duty of the Joint Board to deal with all diseases of an infectious and epidemic character; but whilst the powers and duties of the Board are extensive with respect to existing infectious diseases, they are also strangely limited, inasmuch as the other parts of the Act dealing with prevention of disease, and health matters generally, are under the control of each local authority acting separately within its own district. The danger of multiplying authorities for the purposes of sanitary administration—one authority constituted in accordance with the laws relating to local government, and having one set of functions and powers over limited areas, and another authority, the Joint Board, differently constituted, and exercising limited functions over a wide area—is, that it is apt to lead to confusion and overlapping of the work required by the different independent governing bodies. Sanitary administration by local self-governing bodies as well as administration by a central authority is nowhere in the Commonwealth better illustrated than in the State of Queensland.

In Queensland the local authority is charged with the administration of the Health Act within its own district; the duties of the central authority being to control, advise, and stimulate the local authorities, or, where necessary, to compel the remedying of sanitary evils produced by local inefficiency. However right in principle, it is not very successful in operation, chiefly owing to the fact that the local authorities in Queensland at the present time have not the money, even if they have the inclination, to meet their sanitary obligations.

In New South Wales there is, practically, no local self-government; the central authority being the administrative and controlling power. It is true that sanitary reform is much more easily carried out, and work requiring skill and money may be better done by the central authority acting through or on behalf of Parliament; but direct taxation of the people without adequate representation is never likely to become popular with the masses; nor is it a system conducive to that voluntary action of the people which sanitary education should always have in view. "The vigour belonging to unity of administration," said Earl Fortescue, in his admirable Presidential Address at the Sanitary Congress at Exeter in 1880, "may be combined with the constitutional advantages of local self-government." The dream of the optimist may some day be realised, but up

to the present time no method of sanitary administration ever tried or suggested can claim at once the advantages of simplicity, effectiveness, and popularity. For vigour and unity of action in sanitary administration it is desirable that one body be invested with full municipal powers over the whole area. The greater city scheme—the amalgamation of the numerous independent governing bodies concentrated round the capital of the State under one municipality, with jurisdiction over the whole metropolitan area—seems to me the best solution to the problem.

If the working of our Health Acts in our municipalities be so inefficient, if the influence of example as afforded in our large cities and towns leaves so much to be desired, what can be said of our rural or country districts, as we call them in Australia? Municipal authorities are slow enough to move, even when seemingly convinced; but apathy appears to increase with the square of the distance from the controlling or compelling authority. Excremental contamination of the soil and water, the old tale of the cess-pit and the shallow well, affords sufficient explanation of the fruitful crop of typhoid fever throughout our country districts. The sanitarian who advises that purity of water is a paramount necessity is called a man with a fad. "The supply was good enough for our fathers, and it is good enough for us," is an argument only worthy of Chevalier's Yorkshire farmer:—"I've been moindin' this 'ere farm for forty year, and afore that the pigs in the sty, and I knows wot I knows, and I years what I years, and 'e can't take a roise out o' Oi!"

The position of advisers regarding the means to be used for the prevention of disease is not altogether an enviable one. With the exception of the capitals of the various States, where the Medical Officer of Health is generally a person holding the Diploma of Public Health, and is required to devote his whole time to the discharge of his office, the Health Officer of our local authorities is a general practitioner little skilled in the science of sanitation. With practically no security of tenure, and inadequately compensated as to salary, it is not to be wondered at if the discharge of his public duties are more or less influenced by considerations of his private practice. Thus the Medical Officer of Health has three courses open to him. He may take his salary and do next to nothing, or he may resign his appointment, or, lastly, do his duty and lose his private practice. Until our local authorities can afford to pay a medical man holding a health qualification, and give him security of tenure, with plenty of work to occupy his whole time, we must chiefly rely upon our sanitary inspectors to enforce the provisions of our Health Acts.

Local authorities are required to appoint an adequate number of fit and proper persons as sanitary inspectors. Fortunately, some of our Acts provide that no person so appointed shall have his remuneration reduced, or be removed by the local authorities without the previous approval of the central authority. Such a section is necessary if the inspector be expected to do his duty toward the public with absolute impartiality. To carry out the multifarious duties of his office efficiently, the inspector needs a fair amount of technical knowledge, and, in fact, many sanitary authorities now demand that persons entrusted with these responsible duties should be highly qualified. Some mode of testing the competency and qualifications of persons offering themselves as inspectors under the Health Acts is therefore necessary.

In January of 1901 the first examination for Inspectors of Nuisances was held in Sydney, under the auspices of the Sanitary Institute of Great Britain. A local Board of Examiners has been appointed for conducting these examinations. The regulations and syllabus of the examinations are practically the same as in Great Britain. The Australian candidates locally examined are expected to show a thorough knowledge of the laws in force

in their own States, and a general knowledge of the English Public Health Statutes. Some fifty-two candidates were examined at the first examination in Sydney. Arrangements have been made in some of the other States with the Institute to extend its system of local examinations to their States. A local Board of Examiners, adequately representative of the several professions of medicine, engineering, and architecture, was duly elected as examiners on behalf of the Institute in Brisbane last year. Our first examination in practical sanitary science and for Inspectors of Nuisances is fixed for November next. The certificates to the successful candidates are awarded and issued by the Sanitary Institute, and correspond with the certificates issued in England. But for candidates to acquire the knowledge necessary to hold this certificate of competency, it is essential that they should receive instruction in the subjects formulated in the syllabus for examination. This information cannot be imparted merely from reading textbooks.

A local Board of Lecturers has been appointed to deliver a course of lectures in Brisbane during the year, and a large and up-to-date collection of sanitary appliances, models, maps, diagrams, lantern slides, &c., have been secured for the purpose of illustrating the lectures. Every subject will be taught in a thoroughly practical manner, and inspections and demonstrations conducted by competent persons.

With the dawn of our Commonwealth the time has arrived when, with the assent of the States, the appointment of a Federal Minister of Public Health may seriously be considered; and, further, I shall be bold enough to say that the splendid work accomplished by the Sanitary Institute of Great Britain is an incentive to the establishment of a similar institution in our future Federal Capital. When we consider the object which, as Sir Joseph Fayrer has so eloquently insisted, the Sanitary Institute of Great Britain has kept steadily before it from the outset, viz., "the advancement of sanitary science by the promulgation of sound scientific and practical teaching of those principles on which health depends, by which life is prolonged, and the physical and thereby the moral welfare of the people promoted," it would appear that the establishment of an Institute on the same lines in Australia is worthy of support and encouragement from the country generally, and its politicians and public men in particular. Is such a scheme practicable? Is there any reason why an Australasian Sanitary Institute should not be possible in the city yet to come?

Briefly, the objects of such an institution, I think, should be as follows:—

1. "The advancement of sanitary science and the diffusion of knowledge relating thereto" throughout the Commonwealth of Australia, and the organisation of a national public health service.

2. To secure the services of persons specially qualified to give lectures and instruction on subjects relating to public health and hygiene.

3. To examine and grant certificates of competence to Inspectors of Nuisances, Inspectors of Meat and other foods, and to persons desirous of obtaining the certificates in practical sanitary science, and in practical hygiene for school teachers.

4. To secure uniformity in the administration of our Health Acts, the Food and Drugs Act, Quarantine, Stock and Dairy Acts, as well as concerted action in regulations relating to plague, cholera, smallpox, leprosy, and other preventible diseases.

5. To obtain as far as possible a complete registration of infectious diseases.

6. Public health laboratories to carry out practical demonstrations; the analyses of foodstuffs; the inspection of diseased meat; the testing

of drains and sanitary conveniences; the physical characteristics of good drinking water; disinfectants and methods of disinfection.

7. To organise practical methods of inspection of dwellings, dairies, milkshops, cellar dwellings, slaughterhouses, cowsheds, and nuisances especially connected with trades and manufactories.

8. Demonstration and instruction in practical sanitary plumbing.

9. Congresses to be held by the Institute in various States from time to time for the consideration of subjects relating to public health and hygiene.

10. Exhibitions of sanitary apparatus and appliances to be held in conjunction with the Congresses.

11. The transactions of and the papers read at Congress, and a catalogue of the exhibits to be published.

12. A museum, attached to the Institute, and freely open to the public, containing a well-arranged exhibition of the latest and best sanitary appliances, and wares of manufactures, and issuing photographs, explanatory diagrams, and models of same to the State authorities periodically.

13. The collection of standard works on hygiene, and a well-stocked library of reference books, as well as the control of a lending library, the volumes of which shall be carried post free to Medical Officers of Health and other subscribers in the various States.

14. Organising popular education on the principles and methods of preventing disease, on the feeding and rearing of infants, and on domestic hygiene. In such a scheme as proposed above every department of sanitary science would be represented, and the most essential features illustrated. It is difficult to estimate the influence for good upon the community at large such an institution may ultimately exercise in this country. The funds derived from the fees, &c., could be devoted entirely to the maintenance of the museum and library and the organisation of lectures. There would be little difficulty in getting exhibits from manufacturers, and, indeed, before I left London, some fourteen months ago, I interviewed several of the leading firms in the Old Country upon the subject, and a willingness was at once expressed by them to send the latest appliances to Australia should a museum be established here on the lines of the Parkes Museum in London. The able and energetic Curator of the Parkes Museum, Mr. W. H. Knight, assured me that there would be little difficulty in securing exhibits from the leading manufacturers of Great Britain. Early last year he wrote me to the effect: "As regards your splendid idea of a Federal Sanitary Institute and Museum, I think you are wise in co-operating with other States in the Commonwealth, and doubtless you will be able to make the scheme more comprehensive and useful by treating it in this national way. . . . . I feel sure that you would have no difficulty in getting exhibits from manufacturers. . . . . If you follow the lines of the Sanitary Institute Museum, and aim at a collection for teaching purposes, then the idea of display must be largely abandoned, and duplicates as far as possible avoided. Types rather than variety, with strict classification. . . . . A College of Health would be established which would be both theoretical and practical, and would be serviceable to the Commonwealth to supply medical officers of health, sanitary inspectors, sanitary engineers, sanitary plumbers, sanitary builders, sanitary school teachers, and a sanitary public." Such an opinion, coming from a gentleman of so large an experience and so long connected with the Parkes Museum, and who for so many years has had the organisation of the Sanitary Congresses held by the Institute, is of more than ordinary interest, as showing the proposed Australasian Institute to be not only a possible but a practical scheme.

I have proposed that the Institute should be situated at the seat of the Federal Government, and supported and partly controlled by that body, because I feel that unless the matter be taken up in a Federal spirit it is doomed to failure. I have also suggested that the proposed Australian Institute should, if possible, be affiliated or federated with the British Institute. If this could be brought about it would add dignity and weight to our institution. I proposed this in a letter to Mr. White Wallis, the Secretary of the Sanitary Institute, in July last year. In reply, that gentleman states:—"I think the Council will be glad to consider some form of federation that may be mutually helpful. I am preparing the outlines of a scheme which will be laid before our Council shortly for consideration, and I will let you know how the matter proceeds." In a later letter I received from Mr. Wallis he says:—"Your letter of July has been laid before my committee, and they are quite willing to take into consideration the question of affiliation of societies in the colonies having aims and objects kindred to the work of the Sanitary Institute. . . . . As no doubt your plans are by this time somewhat further advanced, perhaps you could now be able to give me some information, &c." A still later letter from Mr. White Wallis, received during last month, says:—"With reference to your suggestions for the Federal Museum, I think that the idea is an excellent one, but it would depend very largely upon whether the several provinces could be induced to enter heartily into the matter. It would be necessary, of course, to have a centre both for the purpose of the Federal Institute and the Museum in each of the States, and one of the difficulties to overcome would be to give each of these centres a sufficient executive power, and yet retain some control in the hands of the central body. The difficulty of keeping in personal contact with Western Australia, though perhaps not insuperable, would, of course, be great. However, I am only suggesting points that occur to me for consideration, and not in any way as objections to the scheme, which I think would be very helpful. . . . . The amount of co-operation that we can give would probably have to be determined when the scheme is a little more in shape."

Everything now-a-days comes within the sphere of practical politics, even sanitary science, and statesmen are learning that to protect the people from preventible diseases, to encourage the practical application of the principles of hygiene, is as much the duty of executive governments as to formulate a code of laws the practical utility of which would be greatly enhanced could "the general public in whose interests they have been passed" have a more living, working acquaintance with them. Legislation has to a large extent done its duty; what is now wanted is improved administration, with practical demonstration. I leave this proposal of a Federal Sanitary Institute and Museum for that discussion of which I trust you will deem it worthy. A proposal by this Section of Congress would have more weight than if brought forward by an individual member.

A blessing in disguise was the recent visitation of the plague to Australia. With the conspicuous exception of Tasmania, all the States of the Commonwealth have had more or less experience of a pestilence which, when it came amongst us two years ago, created something of a panic. After the first doubts and fears on the part of the public, there came a great sanitary awakening such as Australia had never experienced before. The words "public health," "sanitary science," "hygiene," had for the first time their true signification in the public mind; and thus out of our partial evil came universal good. In the simple bubonic type which formed the great majority of our plague cases in Australia experience taught us that infectivity, in the sense of being communicable from man to man, was practically nil; but that in the pneumonic type we had to deal with a disease which was directly and readily transmitted by human agency.

There are two well-defined types of plague—the bubonic and the pneumonic. The practice of classifying plague as bubonic, pneumonic, septicæmic, nervous, toxic, fulminant, puerperal, pestis minor, or pestis ambulans, is, to my mind, as misleading as it is confusing. Such an artificial classification is probably based upon the degree of severity of attack, the mode of entrance to the body of the bacillus pestis, or the clinical recognition of the organs or tissues affected.

Plague is plague, whether of the deadly or benign variety; just as diphtheria is diphtheria, whether it be faucial or laryngeal. Typhoid fever is typhoid fever, whether the attack be mild or severe; and though tuberculosis may affect many parts of the human anatomy, it has one definite and common bacillary origin. Call the mildest type of plague "pestis minor," "ambulant," "larval," or "abortive" plague, or what you will, it is not to be distinguished as a disease other than plague. The classification is merely one of degree, and not of distinction. It is impossible to read the history of plague in various parts of the world without being especially struck with the fact that a non-fatal malady characterised by glandular swellings, with more or less fever and malaise, preceded or ran concurrently with a well-recognised epidemic of plague. This non-fatal malady was observed in the City of Astrakhan, in Russia, as far back as 1877, and the medical profession of that city were much puzzled as to the nature of the disease until the outbreak of well-recognised plague following immediately afterwards furnished a clue. "Nevertheless," says the report, "certain medical men in Astrakhan did not hesitate to speak of the affection under the term of 'pestis minor,' and Dr. Arkhengelsky, of St. Petersburgh, used the term 'pestis ambulans.' "

A non-fatal form of plague was described by Sydenham as observed in London in 1665-66, and by Foderi, under the name of "benign plague," as occurring in the Levant in the early part of the last century.

The late Sir Richard Thorne, in his report on plague in India, remarks:—"Fever with glandular swellings prevailed in Bombay before it was recognised that plague had reached that city." In the report of the Medical Officer of Health for Glasgow on the cases of plague occurring in that city in 1900, Dr. Chalmers states:—"From the point of view of hygienic administration, the very mild cases of plague are of the utmost importance. The analogy presented by all other infectious diseases indicates that such cases must be regarded as of equal importance with the more severe forms in the possible dissemination of the disease, and constitute, therefore, a grave source of danger to the community."

"Pestis minor," or mild plague, then, is, if anything, more dangerous than plague in its severer aspect, inasmuch as it lulls to a sense of false security unjustified by the circumstances. The slight constitutional disturbance of the patient is often mistaken for another disease; no suspicion is raised in the mind of the medical attendant, the case is not notified to the authorities, there is no attempt at isolation pending further clinical and bacteriological investigation, and it is not until plague breaks out in a more deadly type that the real nature of the malady is discovered. I have said the term "pestis minor" has been misapplied.

The expression "pestis minor" is commonly understood to mean not a mild case of true plague, but a specific form of glandular enlargement which occurs when plague threatens or is present. The fact that the bacillus of plague, or bi-polar organisms resembling plague bacilli, have been occasionally met with in "pestis minor"; the fact that such cases invariably occur previous to or concurrently with cases of true plague leads one to the conclusion that either these cases are really mild plague, and therefore appropriately designated "pestis minor," or minor plague, or

that they are merely cases of glandular enlargements, not of a bubonic plague type, and therefore erroneously called "pestis minor." If pestis minor be not true plague, let us drop the term altogether as applied to buboes of a non-venereal type. We have had but few cases of the so-called "pestis minor" in Queensland; but the public, ever ready to decide when doctors differ, seized upon the statement, purported to have been made by a medical gentleman holding a high official position in another State, to the effect that "pestis minor" was not true plague, and that "pestis minor" existed in his State. Taking this as a cue, a certain section of our community did not hesitate to affirm that all our plague cases, including fatal pneumonic cases, were "only pestis minor." Fortunately, our own medical men were unanimous in their opinion that true bubonic plague existed in Brisbane, and careful clinical and bacteriological examination in all our doubtful cases soon restored public confidence in the medical and health authorities.

The epizöotic amongst the rats has been somewhat extensive in Brisbane, and large sums of money have been spent in killing off the rodents. A gang of some fifteen men has been constantly at work for the last fourteen months laying poisoned baits and catching rats. Great havoc has been made, and a capitation fee of sixpence a head put on all rats, but with all our efforts the cry is, " Still they come." " No rats, no plague," is a truism which supplies a remedy as well as a warning, and whilst all authorities agree that the relationship between rat plague and human plague is now a well-established fact, there are many factors in the rat question which are as yet very imperfectly understood. In the so-called "stamping out" process of plague by our health authorities the best results seem to follow on proper and frequent scavenging, the removal of filth, the elimination of all conditions favouring the existence of rats, and, above all, the steady perseverance in the every-day sanitary work of our communities well and wisely directed.

The campaign against tuberculosis, and the good work accomplished by the various Associations for the Prevention of Consumption in Europe and England, has been an incentive to form similar associations in Australia. Sanatoria for the maintenance and treatment of persons suffering from consumption in the curable stage; the by-laws of our municipalities making the filthy and dangerous habit of spitting upon our footpaths a punishable offence; the compulsory notification of deaths from phthisis; the disinfection of premises; and the dissemination of literature amongst the public forms part of the good work accomplished by our associations, assisted and encouraged by the health authorities.

Most, if not all, of our sanitary codes provide for the compulsory notification of infectious diseases. Notification is merely a means to an end, the end and object being prevention. Prevention is better than cure, but the methods necessary to the prevention of infectious diseases cannot be carried out with any degree of success unless there be systematic, reliable, and compulsory notification. Statistical records, the compilation of figures, the arithmetic of disease, is only of service when it can be utilised for the purpose of suppression and prevention of disease.

If the proper study of mankind is man in the general sense, there is an unusual interest attaching to the study of mankind and the ills he is heir to in the Tropics. Climate and geographical distribution have a marked influence on the grouping of disease.

By far the most promising gain of a substantial kind to practical medicine is the improved method of acquaintance with the causation of disease. Now-a-days we push the microscope to its logical conclusion, and the co-operation of the bacteriologist with the clinician makes it possible for preventive medicine to follow closely on scientific research. The Schools of

Tropical Medicine founded in London and Liverpool afford unique opportunities to medical practitioners and students who intend to follow their profession in the more unhealthy parts of our Empire of becoming acquainted with the diseases peculiar to those countries. Such institutions make for empire as well as for scientific progress, and are lasting monuments to the astute political insight of the Right Hon. Joseph Chamberlain, the Secretary of State for the Colonies, as well as to the energetic and able efforts of Dr. Patrick Manson, the Medical Adviser to the Colonial Office. In the more tropical part of Queensland we meet with diseases which are rare or unknown to many practitioners residing farther south. The relationship of filaria to elephantiasis, the anopheles mosquito to malaria, the malarial parasite in all its phases, the malarial fever in all its types, the bacillus of plague, the amœba of dysentery, the types of leprosy, the symptoms of cholera, and beri-beri, are perhaps more or less familiar to many Australian practitioners; but there are other diseases of Northern Queensland which will well repay scientific investigation. I allude to such diseases as dengue fever, "tick," "Barcoo rot," "Barcoo spew," "Flinders lump," ankylostomiasis, or dirt-eating disease, ulcerating granuloma of the pudenda, and many others. The harvest, indeed, is plentiful, but the labourers are few.

Some closer acquaintance with some special study of tropical diseases is becoming more and more forced upon the medical profession of this country. The best and proper place for making such observations and researches is, obviously, in the places where such diseases are to be found. What is wanted is investigation on systematic and scientific lines, as carried out by the School of Tropical Diseases and Research in London. Cannot a similar institution be established in Queensland?

A fully-equipped laboratory, a hospital for clinical cases, and instruction by competent teachers who have made a special study of tropical diseases would be one of the best efforts in the direction of medical and scientific progress yet attempted in Australia. Suggestion is not sufficient; someone must take the initiative, and the initiation of such an institution can only be made possible and carried into successful operation by the necessary funds becoming available. Our own State Treasury is retrenching, and philosophical millionaires in Queensland are an unknown quantity. David Carnegies do not live in Australia, unfortunately. In an interesting letter I have lately received from Dr. Patrick Manson, he says:—"I am much interested in your efforts toward the study of tropical diseases in Australia, and wish you every success. . . . . I dare say you will find the money difficulty the most serious one. . . . . As a preliminary I would suggest that some half-dozen men be sent home and put through our school, and learn what our experience in teaching the subject has taught us. . . . . What I would be afraid of in Australia is the lack of men who would and could teach the subject. . . . . A first-class experienced man who would devote himself entirely to your proposed school, and act as superintendent and resident tutor, is essential." Will some beneficent government or some patriotic individual at home or abroad furnish the financial impetus to the budding genius of an Australian Koch or Manson?

In conclusion, I would refer most briefly to the important question of food adulteration and food preservatives. The report of the Departmental Committee appointed to inquire into the question in England will, no doubt, now that the report has become available, prove a most valuable and scientific basis upon which useful legislation may be framed; but it is questionable whether we, in Australia, will derive the same guidance from the report as they look for in England. The mass of conflicting evidence furnished by experts and others on the question of food preservatives has not escaped the notice and comments of a large number of food and trade

journals. The perusal of this literature has had its intended effect upon Australian manufacturers and traders, who, in the knowledge born of some more or less reputable expert opinion, boldly clamour for boracic acid in their butters, salicylic acid in their beers, and formalin in their milk. All medical and health authorities seem agreed that the indiscriminate use of preservatives in food is a practice to be greatly condemned, and the matter really resolves itself in the question of how much, and can this limit, if any, be fixed by legislation? Do our climatic conditions, and especially those of Queensland, justify the health authorities in allowing even a small amount of preservatives in our foodstuffs? These are questions which cannot be lightly considered, involving as they do large vested rights and growing and important industries in our States.

The "Adulteration of Wine Act, 1901," of Victoria, is a measure calculated to provide for the manufacture of a wine which not only maketh the heart glad, but also delighteth the analyst. The ignorance of the community regarding the adulteration of foodstuffs is appalling, and what is still more startling is the carelessness, the indifference of the public as to the quality of the articles they are supplied with. It appears almost as if the health authorities would have *vi et armis* to save the public from themselves.

The noblest aim of sanitary science, it has been well said, is the maintenance of the people in the highest state of efficiency, to fit them for the labours of peace or the struggles of war, and in the birth of this Federated Australia let us not forget that the success of Federation in the long run will depend on the quality of its citizens, and good citizens cannot be reared under unhealthy conditions.

Discussion.

Dr. Kendall (Sydney) said Dr. Ham's paper was an important one. He complained of the verbose, long-winded, inefficient character of the Health Acts, especially those of Victoria and Tasmania. They contained involved and confusing sentences in numerous sections. Much of this was, no doubt, due to too close attention having been paid in drafting the Bills to the Health Acts of England, without sufficient regard being paid to the different interests and requirements of these States. He commended the South Australian Act as a great improvement, though he did not say it was perfect. The latest Public Health Act was the Queensland one. It was so drastically drawn up that when it was put into practice it fizzled out. He felt, with Dr. Ham, the necessity for showing the people that scientific hygiene was not a fad, but the outcome of the experience and thought of many men, who had studied the sufferings of mankind throughout the ages.

Dr. McDowell (Sydney) pointed out the reforms that would come with medical officers of health being appointed and paid by a central or States authority, so that he would be independent, both pecuniarily and with respect to the permanency of his appointment. Such an appointed officer would be able to devote the whole of his time to his duties.

Dr. Thomson (Brisbane) felt that hygienic education required to be started in the State schools. A resolution from Congress might advantageously go forth on this point. Every public building should be itself an educative centre, as to sanitary arrangements. At present many of the schools and other public buildings were lamentably deficient in this respect. This was as important as the proposal to establish a Federal Institute of Hygiene.

Dr. Kendall: The sanitary conditions of so many public schools are the worst eye-sores we possess.

Dr. Lovegrove (Perth) sympathised with what Dr. Thomson had said. Central Boards of Health overshadowed local Boards of Health. While they continued to do so, the latter showed a tendency to remain quiescent. Another reason why local Boards of Health were wanting in energy and pushfulness was because they were in the nature of excrescences on Municipal Councils, instead of being altogether separate and free bodies.

Dr. Ham, in replying, urged that, with an improved health administration, reforms would be brought about. He moved—" That in the opinion of this Section the time will shortly arrive when, in the interests both of the sanitary medical service of the various States and the public of the Commonwealth, the Federal Government, with the assent of the States, should appoint a Minister of Public Health."

In reply to Dr. Thomson, Dr. Ham said that the Federal authority could under its Constitution take this course, with the assent of the States.

Dr. Macansh (Victoria) said the feeling was growing that there was altogether too much Federation. (Hear, hear.) Instead of interference with the Medical Officer of Health's duties, his experience was that such officers rather got assistance. They were as a rule carrying out their duties very well, and with much self-sacrifice.

Dr. Thomson was a strong opponent to Federal action. As the Commonwealth Government was going on, it seemed as though it was going to ruin us.

Dr. Lovegrove felt it would not be wise to turn all such matters over to the Federal Government.

The motion was negatived on the voices.

Dr. Macansh then moved—"That in the opinion of the Congress steps should be taken by the States of the Commonwealth and New Zealand to unify the Public Health Acts throughout Australasia."

Dr. Thomson seconded, and the motion was carried.

Dr. Ham moved—"That, for the purpose of collecting and imparting information upon all matters connected with the subject of public health, a national society be formed, to be styled 'The Sanitary Institute of Australasia.' "

Dr. Kendall seconded, and the motion was agreed to.

A further discussion ensued as to insanitary closets, &c., at State schools, and that the elements of hygiene should be part of the State school curriculum.

Dr. Mason said that in New Zealand State school children were taught the principles of hygiene, and a textbook had been specially prepared for Maori children, in their native language.

On the motion of Dr. Thomson, seconded by Dr. McDowell, it was resolved—"That steps should be taken by the Departments of Public Education and other public departments throughout Australasia to make and keep the water-supplies, water-closets, urinals, and other sanitary conveniences of all public buildings, including floor-space and ventilation, in such a condition as to be an object-lesson to the public. That the elements of hygiene, somewhat after the lines adopted in New Zealand, should form part of the State school curriculum."

Dr. Ham moved—"That the term 'pestis minor' should not apply to plague cases." Plague was plague, and the term was not desirable.

Dr. Thomson seconded, and the motion was carried.

SOME NOTES ON THE EPIDEMIC OF PLAGUE IN SYDNEY, FROM A PUBLIC HEALTH STANDPOINT.

BY

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A CONSIDERATION of the facts of the epidemic of plague in Sydney in 1900, when viewed from their public health aspect, practically resolves itself into the following groupings:—

1. The introduction of the disease.
2. The method of dissemination when introduced.
3. Its recognition or diagnosis.
4. Its prevention.

THE INTRODUCTION OF THE DISEASE.

In spite of the most careful investigation, we in Sydney were quite unable to obtain positive evidence of the means by which plague was first brought to Sydney. That it must have come from oversea is of course self-evident. This being so, the allocation of the earlier cases to the neighbourhood of the wharves was only to be expected. At the time of the Sydney outbreak a great pandemic of the disorder was in progress, and still exists. Hong Kong, Calcutta, Bombay, Mauritius, Honolulu, and Noumea were all affected. With all these ports Sydney has more or less frequent and regular communication, and from all of them, except Bombay, vessels reached Sydney within the two months immediately preceding the first case with us. That the case which was considered by us to be the first case was really so admits of no reasonable doubt. The medical profession as a body were aware of the fact that plague was, so to speak, all round us, and would not have overlooked a really suspicious case. Subsequent inquiries at the hospitals showed that no cases of unaccountable buboes had been met with previous to this time, and examination of the Registrar-General's returns demonstrated that no deaths from septicæmia or other causes with which plague might be confounded had been registered for some weeks prior to the "first case." As to how this first patient himself received the infection, the observed facts are that he was employed on and resided near the wharves, and that for a fortnight at least before his case was diagnosed an epizootic of plague was proved to have been raging among the rats at one of the wharves to which this man's business frequently took him.

The report of the Indian Plague Commission, published in 1901, appears to us who watched the whole course of the epidemic in Sydney to take a strangely mistaken view of the influence of rats in the introduction and spread of plague. On the point of the introduction of plague rats on shipboard, the report finds (par. 255) that "there would appear to be no confirmation of the suggestion that plague may be conveyed on board by the embarkation of plague-infected rats." On the question of the conveyance of plague infection from an infected ship to the shore at the port of arrival by agency of infected rats, the report is absolutely silent, though the various means by which infection may be conveyed from an infected ship to the shore are otherwise lengthily discussed.

The Commissioners apparently consider the agency of rats in this regard as unworthy of serious consideration.

At this point the case of the troopship *Antillian* offers itself for consideration. The *Antillian* only arrived in Sydney in March, 1901—many months after the epidemic of plague was at an end. On her arrival in Port Jackson plague was found to have broken out on board of her, and the facts of the outbreak throw a strong light on the manner in which plague might be introduced oversea into a port in the most secret manner.

The *Antillian* was an empty troopship, which arrived in Port Jackson on March 2, 1901, to return with Australian troops to South Africa. She was in shingle ballast, and carried no cargo or fodder; but she had on board a very small quantity of food stores, which was stored in one compartment in the forward part of the orlop-deck. She left South Arm, Capetown, for Sydney, on February 1, and had a clean bill of health issued to her at Capetown. At the date of her departure from the Cape no cases of plague in human beings were known to have occurred.

Rats, however, which infested the South Arm docks, were dying in numbers of some infectious disease before February 5, and on February 9 two cases of plague in human beings occurred in Capetown. Note, that the *Antillian* left South Arm on February 1, and that before the 5th the dock rats were dying in such numbers as to have attracted attention. It is therefore to be taken as a certainty that they had begun to be affected some time before the departure of the boat.

On February 23 and 24, a few days before arriving at Sydney, some of the crew were employed in cleaning up the holds of the ship. During the cleansing fifteen dead rats were found and thrown overboard. On February 27 one of the crew who had been employed in the cleansing operations fell sick, and developed a swelling of the axilla. On arrival of the boat in Sydney the case of illness was seen by some of us, and diagnosed to be plague. A bacteriological examination confirmed this opinion. The *Antillian* was quarantined, and a search made on board for dead rats. Some carcases were secured, and, on examination, were found to have died of plague. The member of the crew who was infected died.

Another of the crew, the storekeeper, subsequently developed plague, but recovered. He had charge of the stores, among which a considerable number of dead rats were found after the quarantining of the vessel. Subsequently the whole ship was fumigated with sulphur to destroy all rats, and, after careful disinfection and a suitable detention in quarantine, was released on March 15.

The case of the *Antillian* illustrates very completely the way in which plague might have been, and in our opinion was, conveyed to Sydney in the first place. Had the *Antillian* been laden with merchandise instead of coming in ballast, there would have been no cleaning of the holds at sea. No case might have occurred among the crew had some of their number not been exposed so closely to the risk of infection, as they must have been during the cleansing operations in the holds and the handling of the dead rats. Had no case occurred among the crew, the vessel would have been allowed pratique, and would have gone alongside one of the wharves, where her infected rat population would have had free opportunities of mixing with and infecting the rat population of the foreshores.

The Spread of Plague in a Place Already Infected.

The point which most impressed itself upon us in Sydney in relation to the dissemination of plague was that direct convection of the infection from man to man never seemed to occur.

Not that opportunities were at all lacking. We had from our reading satisfied ourselves that the infectivity of the disease was low, but we were

quite unprepared to find how very rarely infection appeared to be conveyed from the sick to the well. One should mention here that the type of plague seen in Sydney was always the bubonic or septicæmic form. Save for one somewhat doubtful case, we had no experience of the pneumonic form—a form agreed by all observers to be exceedingly infectious.

The detailed evidence in support of this general observation is as follows:—Secondary cases in the same household hardly ever occurred. Of the whole three hundred and three attacks which constituted the epidemic there were only ten households which furnished more than one case each. One of the latter furnished five cases, and the other nine furnished two apiece. In the ten households referred to, the evidence, while it did not absolutely preclude in most instances the theory of the conveyance of infection from the primary to the secondary cases, was nevertheless opposed to such a conclusion, and rather pointed to the acquisition of infection from a common source. In three of the households the several members of the family sickened simultaneously.

The extension of the epidemic in place and time was opposed entirely to a theory of direct personal infection. Its progress was too slow, and radiated too regularly outwards from the point of origin, to suggest any such idea. This regular radiation outwards is not so apparent when we trace the epidemic on the map as it affected dwellings, but becomes startlingly clear on examining the place of employment of the affected persons. Another fact in this connection is that in many of the warehouses, among the employees of which multiple cases of plague occurred (and the occurrence of multiple cases among the employees of a place of business was frequent in contra-distinction to the facts as observed in private dwellings), the employees affected often came from different rooms and floors of the building, and had even held no communication with one another, the only facts which connected their cases being that they worked in the same building, and were taken ill at the same time, or nearly so.

While the epidemic in the main spread in a radiating direction outwards from the centre of origin, its course along diverging lines was interrupted by obstacles which formed no barrier to ordinary human intercourse. Thus the line of parks formed by the Domain, Hyde, Cook, and Phillip Parks for many weeks formed a barrier to the east which the epidemic seemed unable to pass, and, excepting for a small outbreak at Manly, which was shown to have been preceded by an influx of infected rats, probably carried from Sydney on the ferry-boats, the harbour and its continuation, the Parramatta River, presented an insuperable obstacle to the spread of infection throughout, and though many persons who contracted plague in the infected area returned to their homes on the northern side of the harbour, and were removed from them, no indigenous cases (that is, cases believed to be locally contracted) occurred across the water.

All these facts will be the better appreciated on reference to the excellent spotted maps which were prepared by the New South Wales Health Department, and which I have here to-night for your inspection.

Further evidence on this head could be advanced, but there is no necessity to labour the point overmuch. The facts quoted must be sufficient to carry conviction that in Sydney plague was not "catching"—that is, was not conveyed direct from the sick to the healthy. As regards indirect convection by fomites, merchandise, or other articles, there was no evidence even suggestive of its occurrence. The only exception to this statement was in connection with that class of goods known as colonial produce, which includes hay, corn, and fodder. In several instances localised indigenous outbreaks of plague occurred in advance of the general line of march of the epidemic at or near produce stores or other places (such as dairies) at which hay, corn, or fodder was stored. Everyone is perfectly aware that

rats particularly affect this class of merchandise, and appear at times to be carried considerable distances in parcels of it; and to come to a point, the conclusion which was inevitably impressed on all of us who were engaged in the conduct of the measures for dealing with the epidemic was that plague in Sydney was spread by the medium of rats, and rats only.

That is the only hypothesis which will square with all the observed facts. The enormous susceptibility of rats to plague (far exceeding the susceptibility of the human subject) has been freely admitted on all hands. The only matter in question is whether or not, in the case of epidemics, the infection is conveyed to man from the rat or from some other source, and, in the former event, how *is the infection conveyed from the rat to man.*

In regard to the question of convection from rat to man, our evidence may be summarised as follows:—An epizootic of plague in rats preceded the epidemic in man. The epidemic in man was co-extensive in place with the epizootic in rats, though it invariably followed it in time. The existence of barriers, such as arms of the sea or open park lands, which might be expected to prevent or check the movements of rats, prevented or checked the spread of plague, though it did not hinder human intercourse. In a very large proportion (at least seventy) of the dwellings or warehouses attacked, dead rats in considerable numbers were found, and in quite a large number of such cases (twenty-three) rigid bacteriological proof of the rats having died of plague was obtained. In most other cases the carcases were too far advanced in decomposition for profitable bacteriological examination. In several instances the patient himself or his friends made statements to the effect that shortly before the onset of his illness the patient handled dead or sick rats.

As to the method of convection of infection from the rat to man, our evidence on the point is necessarily more or less vague, but the whole staff of the N.S.W. Health Department are inclined to lean towards the theory first promulgated by Professor Simond that plague is conveyed to man by inoculation through the skin, and that the flea or some other suctorial insect is the intermediary. That the infection of bubonic plague is nearly always received through the skin is evidenced by the fact that primary buboes only appear in glands which receive the lymphatics of the skin. Glands draining internal membranes and organs remain strikingly free from affection. The Indian Plague Commissioners observed a certain correlation between the extent of skin-surface drained by the various groups of glands and the liability of infection of the glands in bubonic cases. Thus the glands of the groin drain a surface which is to the surface drained by all other glands roughly as 6·2 to 4·4, while the hospital statistics quoted in the report show the liability of the glands of the groin to invasion compared with all other glands as 5·8 to 2·3.

In the Sydney series of cases the relative frequency of the invasion of the glands of the groin to all other glands was as 10 to 3, showing a much greater relative frequency of invasion of the glands of the groin in Sydney than in India. If we go more minutely into the matter, and take the femoral chain of glands only, as draining the skin of the lower limb, we find that in twelve thousand observations collected by the Indian Commissioners the femoral chain of glands was affected in just under 30 per cent. of all bubonic cases. In Sydney the femoral chain of glands was primarily affected in exactly 50 per cent. of all bubonic cases. This is rather opposed to what we might expect in view of the fact that in India the natives go barefoot. The Indian Plague Commissioners say (par. 307):—"Another habit which probably conduces to the spread of plague is the custom which prevails in India among the natives of going barefoot. The habit may, we assume, tend to increase the opportunity of contracting plague from contaminated floors, especially as cuts or abrasions

are commonly to be found on the feet of natives." On the other hand, as far as it goes, the evidence is in favour of the flea transmission theory, as the clothing of the lower limbs, while it effectually guards them from abrasions and other accidental injuries, affords a convenient harbour for parasites. Another argument in favour of this theory is that, although a systematic search was made by us in all cases, but rarely was any evidence of accidental injury, even of a slight nature, discovered in the area of the skin drained by the bubo, and one would imagine that the bite of a suctorial insect would be almost the only injury capable of producing inoculation that would be apt to leave no trace within three days.

The occurrence of living plague bacilli in fleas removed from bubonic rats was proved in the bacteriological laboratory by Dr. Tidswell, microbiologist to the New South Wales Board of Health, and although it has been stated that the rat flea will not bite man, that argument is useless in view of the fact that, in addition to the usual rat flea (*P. fasciatus*), he found the common cat and dog flea (*P. serraticeps*) in numbers on many rats, and this last parasite is the common house flea in the United States of America, and feeds freely on the human body. However, I am not holding a brief for the flea theory, which, ably set forth by Simond, has met with much adverse criticism. Though we accepted it ourselves, I am aware that the evidence in its favour is incomplete.

The Diagnosis of Plague

Appears to be attended with very little practical difficulty if one is at all on the lookout for the disease. Even without the assistance of bacteriological evidence, one can clinically pronounce with great confidence in the large majority of instances whether a particular case is one of plague or not. Bubonic cases appear everywhere to form the immense majority in an epidemic.

Pneumonic and septicæmic cases are rare. They were rarer with us in Sydney than elsewhere. We had only one rather doubtful primary pneumonic case and seventeen septicæmic cases among our three hundred and three. Typical attacks formed the great majority of those observed by us. They were marked, to speak briefly, by a sudden prostrating attack of acute illness, accompanied by severe frontal headache, rigors, nausea, often vomiting, and pains in the abdomen or limbs. From twelve to forty-eight hours later a bubo appeared, which rapidly increased in size, attaining the bigness of a hazel-nut or a walnut; often it was much larger. The buboes were always acutely tender, more so than buboes produced by other causes, and, except in their very early condition, were surrounded by much periadenitis, with effusion. In two cases that I saw, this effusion was so great as entirely to mask the existence of the bubo itself, and make it appear that the whole of the upper portion of the thigh was distended and swollen as by a general lymphangitis; the temperature was much raised, but presented no striking characteristic. Drowsiness, accompanied by insomnia, and often going on to extreme mental hebetude, or even stupor, was common. The conjunctivae were congested. There was usually a difficulty or slurring of the speech. The most remarkable general symptom was observed in connection with the circulatory system, which was always profoundly affected. The pulse, whether extremely frequent or less so, large or small, was always very compressible, and often dicrotic in character. The word "sloppy" was used by us to describe it, and it expressed well the sensation which it gave to the finger.

This weakness of the circulatory apparatus is no doubt the cause of the many sudden deaths which occur among plague patients.

I have briefly enumerated the symptoms in the typical cases. There was of course a fringe of aberrant types, though in our experience plague

has fewer of these than most other diseases. The pathognomonic symptom is of course the occurrence of the bubo having the characteristics of the plague bubo, and not accountable for by any other existing condition. Bacteriological confirmation is generally easily obtained. The plunging of a hypodermic needle into the bubo or its surrounding exudation and the removal of a droplet of the fluids rarely fails to demonstrate these fluids to contain b. pestis. They are usually swarming with it. Our first eighteen cases were all confirmed bacteriologically. Subsequently we had acquired confidence in diagnosis, and it was only found necessary to rely on the bacteriological methods for diagnosis in a small proportion of cases.

The Prevention of Plague.

The question of the prevention of plague naturally falls under two heads—that of its primary introduction into a hitherto clean place, and that of its spread when introduced. If our observations and the deductions we drew from them are correct, the whole question of the spread of plague is simplified, as it becomes that of the introduction and spread of the plague-infected rat. We may disregard entirely the possibility of an epidemic of pneumonic plague, of which no extensive epidemic, apart from the bubonic form, has ever been recorded. In regard to this question there is one measure of perfection which, if faithfully pursued at all ports, whether infected or not, during the course of a pandemic of plague, would probably entirely prevent the spread of plague from infected to clean ports. That is the complete destruction of all rats on board of every vessel before she commences to load her cargo—and rats are so easily destroyed upon an empty ship by fumigating with sulphur dioxide that this measure is comparatively a simple one. The only difficulty would be to induce a universal practice of it by all port authorities. The thoroughness of this measure is evident. If a boat leaves her first port of departure clear of rats, even if one or two plague-infected animals should be picked up with cargo at intermediate calling stations, there would be no rat population on board to become infected, and the disease would die out for want of fuel. As subsidiary measures, the use of discs on mooring cables, berthing a few feet away from wharves, and the hauling up of gangways at night, should not of course be neglected. In the absence of such a generally-agreed-on measure as I have referred to, the second line of defence becomes the only rampart, unless the fumigation of ships from an infected port is made compulsory before unloading cargo. Under such circumstances, however, the fumigation appears to be less certain in its action, and far more difficult to perform, than in an empty vessel, and there are some delicate cargoes, such as teas, which are said to be prejudicially affected by the fumes of the sulphur. The discharge of a cargo on to lighters in the stream and the subsequent fumigation of the vessel before she reaches the wharf have been proposed. These measures do not absolutely safeguard the port of discharge from the landing of one or two sick rats among the cargo, and the lightering is so expensive as to interfere with trade, and rouse the bitter opposition of the shipping interest. The root of the matter is that rat-free ships will be plague-free ships. The whole question of the introduction of plague into a port groups itself round this axiom.

The ethics of the spread of plague when introduced appear to be equally simple. Infection attaches to dwellings and work-places, and is not spread directly by human agency. It would appear that if buildings are kept free of rats their occupants would not contract plague. The extirpation of rats in a large town would seem to be outside the realm of practical politics. It is easy to keep houses free of them. Dwellings

can be so constructed as to be practically rat-proof. All buildings which, from the purposes to which they are applied, are specially liable to be infested by rats, such as produce shops or grain stores, should certainly be so constructed. Both in India and in Sydney grain and fodder stores have over and over again been observed to act as foci for the radiation of plague. Sydney has profited by its experience, and the municipality is enforcing the construction of solid concrete floors in all such places. When plague has entered a district, the free use of poison by householders should be urged on them by the authorities through proclamation, posters, or otherwise. I regard trapping as of little use. Twelve months' trapping in Sydney on a large scale appeared to have but little effect upon the numbers of the rats.

The use of poison by householders, combined with the efficient stopping of rat-holes and general maintenance of houses in good repair, will keep the houses free of rats. Municipalities and other public authorities should be able at least to sensibly diminish the numbers of the outdoor rat population by an intelligent use of the same means combined with trapping and the fumigation of underground drains.

General sanitation must of course not be neglected. Extra care should be given to the removal of garbage, and all persons should be compelled to keep their premises clean and free from accumulations which might harbour or support the rat. If such measures are vigorously pursued, even in a town which is so unfortunate as to have become plague-infected, I venture to think that the enemy can be kept under. Other matters which should be discussed under the head of prevention include the notification, segregation, and treatment of the sick, the segregation or surveillance of "contacts," protective inoculation, and disinfection. Our experience as regards most of these matters did not materially differ from that of other places, and does not call for comment in a short paper. Although throughout the epidemic of 1900 the removal and segregation of "contacts" was rigorously practised, it was only continued after a certain period early in the epidemic, in response to popular feeling. It soon became evident that the measure was unnecessary. All that appears to be requisite in this regard is to keep the "contacts" under medical surveillance after the discovery and removal of the patient for a period of time corresponding to the maximum plague-incubation period. This practice is now being adopted in Sydney with respect to the sporadic cases of plague which have occurred since last November.

THE RATIONAL METHOD OF SEWAGE DISPOSAL.

BY

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Man, while following the paths of civilisation, has unwittingly originated many diseases as the inevitable concomitants of the aggregation of communities, and the extension of those industries which are a source of wealth to a nation. It is highly probable that many of these diseases might have been easily avoided, if only a small amount of common-sense had been exhibited in the past; but owing to prejudice, ignorance, and apathy, they have been allowed to maintain their position, and to exercise their influence on the physique of succeeding generations. It is only during recent years that we are beginning to appreciate the teachings of nature, and to understand the jurisprudence of self-preservation. From a sanitary point of view, the decentralisation of any industry would be most beneficial to a community, and if we compare the mortality occurring among the industrial population which produces the national wealth, with the mortality occurring among the agricultural population, of any country, it at once becomes apparent that our vast national accumulations have to be paid for by a frightful shortening and sacrifice of human life. It is the province of the sanitarian, and the aim of sanitary legislation, to minimise the evil which is undermining the vitality of the nation, and, as it is impracticable to decentralise industries, so to rid man of the waste products of his vital action, and those impurities due to trade wastes, that the atmosphere in which he lives, may become thoroughly oxygenated and renovated. If the lower forms of animal life are kept continually surrounded with the waste products of their being, they soon waste and die. Man not only has to deal with the waste products of his being, but also with those impurities which result from the wastes occurring during the processes necessary for properly carrying on any industry. It follows, therefore, that the preservation of the health of man depends upon the hygienic improvement of his environment, and upon the safe and speedy removal of the waste products of his vital action.

Sewage is a highly-complex liquid, which is variable in its strength and composition. It consists of excretory substances, household wastes, vegetable refuse, soap, rain-water, grit, detritus, the liquid resulting from street-cleansing, and the waste products from the various trade industries. The sewage of to-day is not the same as that which Health Commissioners of the time of Henry VIII., or even later, had to deal. Sewers are no longer elongated cesspools, which were dependent for their cleansing on the amount of rainfall; and the sewage which they convey is no longer concentrated putrid refuse, but is so diluted with water that it flows freely along the channels provided. The great point to be considered in dealing with sewage is how this complex matter, which is capable of giving great offence, and of causing much disaster, may be so purified by the action of the beneficent forces of nature, that it may assume its proper position in the economy of life, and become a powerful fertiliser of the soil, without in any way menacing the health and life of man himself. When the physical organisation has to develop into maturity under unhealthy conditions, such as bad air, impure water, &c., it will be a degenerate product, for unhealthy conditions lead to bodily degeneration, and bodily degeneration has a tendency to produce mental degeneration. To prevent epidemics of disease, it is necessary to promote the due observance of the laws of health, and in all matters of hygiene

we must act upon the principle, that the only way to get rid of epidemics of disease is to remove those conditions which produce them. From all the foregoing it will be seen that the purification of sewage is very important, and that it is also very important to direct its disposal, so that the soil may remain unpolluted, for a polluted soil may contaminate a water-supply, and thus produce a state of affairs detrimental to the health of man, by impairing or destroying the health-giving properties of a most valuable adjunct of life. "National Health is National Wealth." The direct nuisance produced by sewage is usually the development of organisms fed by organic matter; and it is less important to remove these organisms than to remove their pabulum, contained in the sewage itself. The improvement, therefore, of the environment of these organisms by purification of sewage implies their destruction.

In all towns adjacent to the sea or ocean, it has been the acknowledged practice to convey sewage matter thither, so that it will be broken up and disposed of by the action of the waves. It has been found, however, that sea-water delays the oxidation of the organic matter in sewage, so that its foul constituents are preserved and washed back upon the adjacent foreshores, where it may accumulate in sufficient quantities to form dangerous deposits, which will be so influenced by the quickening action of the summer sun, that gases injurious to health will be evolved. Tidal estuaries also do not allow sewage to travel to a sufficient distance out into the sea away from the shore. It is evident, therefore, that although disposal of sewage into the sea may be ready, and appear to be economical, still the result obtained is by no means perfect.

Another most unclean and dangerous practice is the turning of the sewage of a city or town into the adjoining river, with the vain hope that during the progress of a long length of stream, purification would take place by means of sedimentation. This was a most fallacious theory, and even minute quantities of sewage, may, when introduced into a river stream, cause a vast and costly epidemic of disease in a city, town, or village, situated many miles lower down. The Scriptural teaching, that all refuse is to be buried in the soil, where it will be transformed into innocent substances, is undoubtedly a suitable method of sewage disposal in sparsely-populated districts, but it is altogether wholly impracticable in crowded towns or villages, as there is a difficulty in obtaining a sufficient area of suitable soil. If a soil becomes overloaded with refuse matter, purification does not take place, and thus the sewage is distributed in a dilute form by the underlying ground water, which may thus pollute a neighbouring water-supply, and cause foul emanations to be given through the soil to the overlying atmosphere. A given area of land is supposed to be capable of dealing with the sewage of a given number of people, and to meet the difficulty of sewage disposal, this theory was carried into practice, and it was considered wise to set apart a piece of land of such an area that it would be capable of dealing with the sewage of a certain population, and that in this area the actions of nature would be, as it were, under control. Such was the origin of the sewage farm.

At Botany, near the City of Sydney, New South Wales, the sewage farm comprises an area of seventy-one acres of land, which is composed of raw drift sand, which is useless for agricultural purposes, except on that portion of the farm which has been in use for a number of years, and upon which fair crops can be grown, if the sewage is applied to the land in a state in which it is capable of being assimilated by plant life. The sewage from the southern outfall passes to the screening chambers in the inlet house, where all the grosser particles—corks, &c.—are screened off, and the liquid sewage is allowed to pass on to the siphon-well. The sludge thus intercepted is grabbed out of the various chambers, and carried in railway trucks to the various irrigation-beds, on which it is deposited. This method is undergoing modifica-

tion, and in a short time the sludge will be forced across the river by a submarine line of ball and socket pipes. From the siphon-well the sewage passes under the bed of Cook's River by a cast-iron inverted siphon, 2 feet 9 inches in diameter, which is connected, on the opposite side of the river, with another well in the outlet-house. From the outlet-house the sewage flows along the main carrier, and is distributed during its course over the various irrigation-beds and settling-tanks. The irrigation-beds and settling-tanks at the Botany Sewage Farm receive an average of 3,000,000 gallons of sewage daily, and they are worked alternately.

The cost of maintaining the sewage farm amounts to the sum of £2257 4s. 4d. per annum, and the income realised by the sale of the produce and stock, products of the farm, amounts to £210 0s. 3d. The application of crude sewage to land has always been attended with difficulty, for it has a tendency to cake upon the surface of the soil, to prevent air getting at the roots of plants, and so to retard the ripening of the fruit and grain. The plan of treating sewage by land depends for its success upon the fostering of, and the increase of, those micro-organisms which are found in the upper layers of the soil, and upon that purifying action which these bacteria exert, during the slow passage downward through the soil of thin films of liquid, over surfaces exposed to the air which is lying in the interstices of the soil. This process of transforming sewage depends upon oxidation or nitrification, which is perfected by a fermentative action, promoted by those micro-organisms which were just alluded to.

The main idea of the establishment of a sewage farm is to have the treatment of sewage under control, but irrigation-farms often create a nuisance at some time or other, and there is a sentimental objection to using anything produced on them. A very serious objection to a sewage farm is the difficulty of obtaining a sufficient area of suitable soil, in a convenient situation. Unless there is sufficient acreage, this form of sewage treatment, which depends upon the surface soil for purification, will be seriously interfered with; and as a sufficiency of acreage is very necessary to maintain the continuous aeration of the soil, an insufficient surface space will allow the sewage matter to cake on the surface, the soil to become choked and waterlogged, because the area provided is insufficient for the proper distribution of sewage. This is very important, for continuous and free aeration of the soil is needed to enable the micro-organisms to effect purification, and unless such a state obtains, the air will be prevented from getting to the deeper layers of the soil, an effluent will be produced which lacks proper purification, and some of the raw sewage may escape or be discharged, unchanged in its composition. However porous a soil may be, a quantity of evil-smelling liquid rises into the air, and however rapidly the sewage may sink into the earth, a certain portion must escape by evaporation, and rise into the air before it has a chance of being purified.

According to Bailey Denton, "the treatment of sewage by intermittent downward filtration is the concentration of sewage at regular intervals on as few acres of land as will absorb and cleanse it without preventing the reproduction of vegetation." The efficient maintenance of such land, however, requires that the sewage shall be prepared by straining before it is sent on to the land, that the land shall be constantly aerated by being dug over and ploughed up, and that care shall be taken to deliver for surface irrigation only such quantities of sewage as are required by the cultivator. To attain this end we must take advantage of the power which land possesses of cleansing sewage by intermittent downward filtration. For the proper purification of sewage matter, it is most essential that bacteria shall be present to aid that process of nitrification which depends upon an organised ferment. In intermittent filters the purification through these micro-organisms depends upon oxygen and time, which renders it necessary, therefore, that the surface of

the filter shall be in no way clogged, to the exclusion of the entrance of air in large quantities, for if the filter becomes impervious to air, the effluent gradually grows to contain as much organic matter as the crude sewage itself, or even more than it does.

Many years ago Cagniard de la Tour recognised that the natural purification of organic matter in the soil was due to living organisms; and the labours of Pasteur, Frankland, Koch, and others have demonstrated very clearly that the action of soil as a filter was not merely mechanical, but chemical. The biological condition of the soil is also, directly and indirectly, an important factor in determining the course of sewage purification. Man, however, with the solution of the difficulty of sewage disposal at his feet, sought how he might control the actions of nature, and introduced a system of chemical precipitation, in order to get rid of the more solid portions of sewage. It is always very necessary to distinguish between the technical value of any data, and their scientific function, and consequently, although we may, and do, for the time being, get rid of troublesome substances, through the chemical precipitation of sewage, still we may, while so doing, overlook the scientific function of the precipitating agent. The chemical precipitation of sewage means the deposition of the insoluble matters, which are in suspension in the sewage, together with a certain proportion of the organic matter which is in solution. Solid compounds are formed through the action of the precipitating agent, which in settling, drag down with them the suspended matter. Lime, which is most commonly used as a precipitating agent, has a solvent action on the suspended matter, and forms an insoluble carbonate of lime, which acts as a weighting material, "entangling the flocculent masses in suspension, and carrying them down to the bottom of the tank" with it. When the tank effluent is run off, carbonic acid is given off, and lime is deposited in the soil. "The addition of an excessive quantity of lime, while affording a rapid settlement of the sludge, and a more or less clear effluent, dissolves a by no means inconsiderable quantity of the offensive matters previously in suspension, and thus it is apt to render the last state of the liquid worse than the first."

As mentioned before, the purifying action which takes place in sewage while passing through the soil, depends upon the action of certain micro-organisms, which are found in the upper layers of the soil, and therefore in all methods of sewage purification, attention must be paid to this biological characteristic or to its evolutionary significance. The biological law of natural selection, which has a tendency to the extermination of the weak, is well demonstrated by the destructive action of the strong saprophytes upon pathogenic bacteria. In those methods of sewage purification in which a chemical agent is employed to institute precipitation, there is no bacterial action, the effluent produced is liable to a secondary decomposition, and the organic matter left is more objectionable than sewage itself. When lime is used as the precipitating agent, it destroys those organisms which are necessary for the purification of sewage, it forms a bulky sludge for which there is no commercial demand, as it is of no manurial value, and the effluent produced is likely to take on secondary decomposition, when it is discharged into a large body of water. In order to get rid of the sludge, it has to be tightly compressed in sludge presses, to express any moisture, and the liquid obtained during this process is likely to originate a highly-offensive nuisance. The compressed sludge is then consigned to the furnaces, where an attempt is made to change its character, and foul fumes are given off.

At the North Sydney outfall this method of treating sewage was in vogue till about six months ago. The sewage flowed from the main carrier into a channel, where it met with and became mixed with a stream of milk of lime. This mixture then passed on to the settling-tanks, where it was allowed to remain quiet for a certain time for the preciptation of the sludge

During this period of rest the combination of the lime and the solid matter of the sewage settled at the bottom of the tank, and the supernatant watery fluid was decanted off and sent on to the sand filter-beds. As soon as the liquid contents were removed, the sludge was taken from the tanks, mixed with more lime, and placed in the sludge presses, where all moisture was expressed, and the highly-offensive liquid sent into the main carrier. The sludge was then thoroughly incinerated, and afterwards dug into the sand beds. It was supposed that when the sewage was sent on to the sand-beds, after being treated in the precipitating tanks with lime, it would undergo a process of complete purification, and that an effluent would be produced, which would be innocuous, and that no harm would result if this effluent were discharged into the waters of Port Jackson. Unfortunately, the result of this method has proved very disappointing, and the effluent produced was more objectionable than the sewage from which it was obtained. The annual cost of the working of this outfall was £1968 19s. 6d. The lime used cost £400, the coal £600, wages £868 19s. 6d., and incidentals £100. As there is not any profitable reproduction at this outfall, the cost is not in any way reduced. Notwithstanding the admitted deodorising and disinfecting powers of the soil, still it does not immediately absorb and destroy all the offensive matters of sewage. The constituent parts of sewage are chiefly of organic origin, and in the sewage an active process of decomposition takes place, which renders the organic matter in a state fit for plant food. This process in the soil is one of digestion, in which various small animal and vegetable organisms utilise their organically-fixed power for their life purposes, and, as before stated, promote oxidation, and the resolution of highly-complex matter into simpler substances. The organic matter in sewage is essentially manurial, and includes all the nitrogen eliminated from the bodies of men and animals, as well as phosphoric acid and potash. The supply of phosphoric acid and combined nitrogen, which are very essential to plant life, is not unlimited, and every grain of nitrate which can be rescued from sewage is a clear gain to the community. In sewage there exists a large number of organisms which are essential for its own destruction, and break up the material of which it is composed. Under favourable conditions these organisms may be so cultivated, as to effect the desired purpose of sewage destruction; and when sewage is brought into contact with properly-constructed artificial filters, it is immediately attacked by living organisms, such as are universally present in the upper strata of the soil. In such filters these organisms exert an influence, through which the harmful portions of the sewage are deracinated, and the elaborate processes of the laboratory of nature are so closely imitated, that an innocuous effluent of high manurial value is produced.

There is, therefore, no weight in the objections of those who base their argument on an abstract or nebulous idea, without knowing the circumstances of environment, and oppose their vapid ideas to the truth of known facts. The resolution of the highly-complex matters found in sewage is called hydrolysis, and is performed by the natural enzymes, which are the product of animal and vegetable life, and render large quantities of solid matter quickly soluble.

The satisfactory type, therefore, of sewage treatment involves this process of hydrolysis, which is the disintegration and liquefaction of solid matter. It has been very clearly proved that the whole work involved in transforming sewage can be very capably performed by bacteria, without the aid of any precipitating agent. The lime process has very little to recommend it, as it is difficult to accurately adjust the lime in proper quantity to the sewage, and it produces a poor effluent. The complete destruction of organic matter involves the presence of free oxygen, to aid those processes, which are initiated and carried out by bacteria. The rapidity with which the various

bacteria liquefy the solid organic matter varies considerably, and it is claimed by Mr. Cameron that those bacteria which live in the absence of air are the most active liquefying organisms. The septic tank, originally covered, but now left uncovered, is really a cesspool, or receptacle, which favours the multiplication of certain organisms, and brings the whole of the sewage matter under their influence. In the septic tank it is intended to promote the growth of the liquefying organisms present in the sewage, and the chief intent of this method of sewage purification is the disintegration and liquefaction of the solid matters of sewage, so that it may be prepared for the action of the biological filters in the second part of the process. The inlet and outlet are submerged, so as to minimise the disturbance of the contents of the tank by the incoming and outgoing streams, and in the case of the covered tank, to prevent the admission of air and the exit of gases. This system of sewage disposal is installed at the outfall works draining the district of Chatswood and North Willoughby. At this outfall the sewage passes into open septic tanks, and from them is discharged into the coke filters, the effluent from which passes into an adjacent creek.

The cost of maintaining this system amounts to £180 per annum. When sewage fills the septic tank, a scum 3 or 4 inches thick forms on the surface, and flakes of organic matter fall to the bottom of the tank. At the bottom of the tank, decomposition takes place, and bubbles of gas are carried from this fermenting mass out at the top of the tank, and in this way millions of bacteria are continually falling with the organic matter from the scum to the bottom of the tank. The whole mass in the tank is thus constantly interchanging, and the liquefying bacteria are thus brought into contact with the whole of the organic matter in suspension. The solid or organic matter in suspension has been rendered soluble, and the total organic matter is actually reduced by the process, the lost organic matter being given off in the form of various gases.

Messrs. Dibdin and Thudichum made a series of experiments which prove that the septic tank is not actually a necessity for complete purification. They show that as "the whole of the purifying action is due to the encouragement given to the genesis and living of the micro-organisms," better results are obtained by allowing the sewage to flow directly on to a bacterial tank composed of stone ballast, or burnt clay, where it becomes disintegrated and liquefied by the same class of organisms as are found in the septic tank.

As far back as the year 1892, Scott-Moncrieff proposed the utilisation of bacteria in the treatment of sewage. He constructs a bacterial tank of graded ballast in the same manner as Dibdin; but in order to get rid of the sludge, he arranges the tank so that filtration takes place in an upward direction. The treatment of sewage in the septic tank of Cameron, the bacterial bed of Dibdin, and the cultivation-tank of Scott-Moncrieff, aims in each case at disintegration and liquefaction of sewage matter through bacterial action. but in order that the sewage shall become properly purified, another stage of purification is necessary. In this second stage the process is accomplished by the action of those micro-organisms which will not live except in the presence of oxygen. To supply a sufficiency of oxygen, aeration is necessary. No system of cascades, as formerly was supposed, is sufficient to adequately oxidise an effluent through aeration, and the purifying action of aerobic bacteria. as we have already seen, best takes place during the passage of thin films of fluid over surfaces exposed to the presence of air. The secondary filters in which this process is carried out are composed of coke, breeze, burnt clay, granite, coal, &c. They are arranged in a series, so that, when one is filling, the others are resting or emptying. There is therefore a period of filling, a period of resting, so as to allow the sewage matter to be thoroughly acted upon, by the aerobic organisms, and a period of emptying, during which the air is drawn in by following the sinking

fluid, or by filling the vacuum caused by the sinking fluid. This period of emptying is most important, as the fresh amount of air taken in during this period assists the organisms in perfecting their attack on a fresh supply of sewage. Deficient aeration causes a filter to act badly, but if the aeration is efficient, organisms which are exclusively anaerobic will disappear, and, according to Houston, " 99 per cent. of the pathogenic bacilli can be removed by the action of a septic tank, followed by treatment in a well-aerated filter." There is no advantage to be derived from an excess of oxidation, for as aerobic organisms are non-putrefactive, their capacity for work depends upon the power of the water containing them to absorb oxygen. The action, therefore, which takes place in these filters is a vital one, and requires that the material used as a filtering medium should afford good interstitial space to allow of the free introduction of air when the bed is emptied, so that the bacteria may be enabled to increase their activity. If the action of these filter-beds was merely one of straining, they would soon clog and become useless. Gas coke is usually considered to be the best material for filling these beds, as it permits of a greater volume of sewage being present, through allowing of a greater interstitial space than any of the other proposed media.

Garfield, of Wolverhampton, however, maintains that " coal has a special power of removing putrescent organic matter from sewage, that it has at once a chemical action, and that its purifying power is marked from the first day it is used." Whatever material may be used for filling these beds, it is very important to remember that the action at first is not perfect, and that the capacity for purification improves and increases with time. It ill becomes anyone at this time to dogmatise, but it appears as if we have at last regained the track to follow the true teachings of nature as regards sewage purification. " The biological treatment of sewage is conducted under control, and all pathogenic bacteria disappear when passing through the filters by being crowded out in the struggle for existence, in a nutritive medium containing a mixed bacterial flora, by the numerous harmless varieties of enzymes, of the saprophytic species, which thrive at ordinary temperatures."

The difficulty which has always presented itself, in all methods of sewage purification, is the formation of a refuse product known as " the sludge." This separates, for the most part, as a scum or deposit in the septic tank, and is left as a black mass on the bacterial bed. Drs. Kenwood and Butler have made numerous experiments with regard to the getting rid of this evil. They are of opinion that it may be got rid of most effectually by first passing the sewage through a Scott-Moncrieff cultivation tank, in which filtration takes place in an upward direction, and then continuing the process in the coke beds, where the filtration is in a downward direction. They believe that while " upward filtration offers a better prospect of effecting the separation and solution of the suspended matters in sewage, it at the same time reduces the pollution of the effluent better than any system which aims at their removal by digestion in a hollow chamber, such as the septic tank." The sludge disappears in the substance of the Scott-Moncrieff cultivation chamber.

At the Rockdale end of the Botany Sewage Farm a small series of experimental tanks has been installed to deal with the waste products of 160 persons. The installation consists of a Scott-Moncrieff cultivation tank, and four biological filter-beds, two being filled with coke, and two with coal. The Scott-Moncrieff cultivation chamber works well, gives off no smell, and as yet shows no sign of being in any way clogged. After the sewage has undergone a process of disintegration and liquefaction in the Scott-Moncrieff tank, it is discharged automatically over each of the biological beds, as they may be ready to receive it. These beds are in turn rested, emptied, and filled, by another automatic arrangement, so that each bed has its period

of filling, resting full, discharging, and resting empty. The cost of maintaining this instillation is about £100 per annum, and it would cost little, if any more, to maintain an installation of the same character, even if it were five times the size.

Mr. J. M. Smail, Engineer-in-Chief to the Metropolitan Board of Water Supply and Sewerage, states:—"The experience gained at Botany is that it requires twenty-five acres of land to be prepared, to deal with 1,000,000 gallons of sewage per day. To prepare one acre of the existing surface for receiving sewage would cost £483, the subsoil drainage £100, and the distributing drains £20, making a sum total of £603. The preparation of twenty-five acres, therefore, would cost more than £12,000, while 1,000,000 gallons of sewage could be dealt with by an installation of bacterial tanks at a cost of £10,200, which would mean a saving of at least £1800 per 1,000,000 gallons of sewage treated. To provide for the necessary future treatment of sewage on the farm would cost £36,000 for land filtration, as against £30,200 necessary for installing the bacterial system, showing a saving of £5800 by using the latter treatment. The adoption of the bacterial system at the Botany Sewage Farm would bring about an annual saving of £3363, or sufficient to pay the interest on £110,513."

In order to test the value of the effluent from the before-mentioned installation, at the Rockdale end of the farm, it is turned on to a small plantation, which at the present time yields fine crops of vegetables. At North Sydney outfall, as before stated, an attempt has been made to purify the sewage by means of lime precipitation. Several difficulties have presented themselves to this form of treatment. First, the effluent produced showed little or no purification; second, the effluent readily decomposed, and was, in fact, at times, worse than the original sewage itself; third, the bulky sludge produced was of no manurial value, and was difficult to get rid of; fourth, the liquid expressed, through compressing the sludge, was highly offensive, and likely to cause a nuisance.

The outfall works at North Sydney consist, in addition to all the machinery, of six large brick and cement settling-tanks, and a series of sand filter-beds. Two of the settling-tanks are kept empty, three have been changed to open septic tanks, and the sixth has been divided into three parts. The first of these divisions is filled with graded ballast, and is used as an upward filtration tank; the other two divisions are filled with graded ballast and gravel, and are used as downward filters. From the analyses which I have made from time to time, I find that the effluent produced by this sixth tank shows about 35 per cent. of purification, and that the effluent which is obtained from the filter-beds where they discharge into the waters of Port Jackson is purified to the extent of 58 per cent.

It will be seen from the contents of this short paper that in the metropolis of Sydney we have had a very varied experience in the matter of sewage purification and sewage disposal. At the northern outfall we have the sewage disposed of by the action of the sea. At the southern outfall we have the sewage treated by land filtration. At the western outfall we have the installation of the Scott-Moncrieff cultivation tank and the coal and coke filter-beds. At the North Sydney outfall we had the precipitation treatment by means of lime, and now have the system already described. At Willoughby outfall we have the septic-tank system.

The moot point for consideration in comparing these various systems is which system up to the present has proved itself the best? In debating such a point two things naturally come into the foreground of our logic, viz.: economy and effect. Economy as to the amount necessary for maintenance and expenditure has already met with some consideration, and we have seen that the biological method of treating sewage needs a less costly expenditure than other methods, and that a very considerable saving is effected in the cost

of maintenance. The substitution of the present mode of treating sewage at the North Sydney outfall, for the old system of precipitation by means of lime, has brought about a saving in the cost of maintenance of £800 per annum, or capitalised at 3½ per cent., of £22,857. The biological method of sewage treatment makes it possible to provide inland towns with systems of sewerage, without incurring the expense necessary to provide costly sewage farms with costly sewerage systems.

Whether it will be advisable to substitute this form of treatment for the disposal of sewage by the sea, as yet remains to be proved; but, in my mind, there is no doubt that such will be found to be the only true solution of the difficulty of sewage disposal, not only on account of the economy of maintenance and expenditure, but also on account of that economy which concerns the maintenance of plant-life. It has already been mentioned that plant-life needs nitrate for the completion of its life cycle, and its sphere of usefulness, and we know full well that this useful substance is daily lost in unmeasurable quantities by discharging sewage into the sea, or into other such places whence there is no opportunity of recovering it. If, then, through scientific research, any method of sewage disposal has been placed within the reach of man, by means of which this valuable adjunct and necessity of the economy of plant-life can be recovered, it is our duty to carefully consider such a method, and to endeavour to perfect it.

In discussing the question of sewage disposal, one must very carefully study the nature of the sewage to be disposed of, and the locality whence the sewage is discharged, as each locality needs special plans and special treatment. During the great Victorian era, through the great improvement in arts and applied sciences, many methods of sewage treatment have eventuated. The chemical treatment has had its advocates, but the experiments of Dibdin and Dupre have thoroughly proved "that the antiseptic treatment of sewage by lime and other precipitating agents is a mistake." Our own experience with this method at the North Sydney outfall has led us to conclude that the use of lime as a precipitating agent is not only a fatal mistake as regards purification of sewage, but also because it produces an effluent which is of a worse nature than the raw sewage itself. The experience gained at the Botany Sewage Farm is not such as to lead us to believe that the best form of sewage disposal is by treating through land, although this system has been so much lauded by Colonel Jones and others. At Botany we find that when the beds are worked with a small quantity of sewage, they produce a fairly good effluent, but that when they are taxed to their full capacity, the effluent produced shows only signs of mechanical separation, without any evidence of purification.

This, then, clearly shows that for efficient sewage purification, a large acreage of land is necessary, and that where such an area cannot be appropriated, the land treatment of sewage will prove a failure, and that we must look for some more constant and readier method of sewage purification, which can be installed and carried on in a smaller area. From the analyses made by Mr. W. Doherty, Assistant Government Analyst, and myself, the installation of the Scott-Moncrieff tank and the biological tanks at Rockdale gives an effluent showing 70 per cent. of purification, and I have found as much as 80 per cent. of purification.

The septic tanks at Chatswood show 65 per cent., and occasionally 70 per cent., of purification. The present system at the North Sydney outfall works yields an effluent showing 55 per cent., and occasionally 60 per cent., of purification.

I have avoided leading you into abstruse calculations, and have endeavoured to put before you the advantages and disadvantages of the various systems of sewage treatment. When you weigh carefully all the facts of the case, you will see that we are at last upon the right track, and that the

most rational and best system of sewage purification is that recommended by Drs. Kenwood and Butler, viz., a Scott-Moncrieff upward-filtration tank, supplemented by a series of biological filters, filled either with coal or coke. It matters little what material is used for filling the filters, as long as it is hard enough to withstand weathering action, and the particles are so large that capillary attraction does not prevent the free passage of the air into the interstices of the filter. Probably the best and simplest form of the system recommended is that suggested by Dr. Sydney Barwise. He sends the sewage with a velocity of 40 feet per minute, into a detritus tank, where, by a swirling movment of the sewage, the detritus is deposited on the sloping side of the tank, thence the sewage passes through iron screens, the bars of which are half an inch apart, and then under a scum board. After being screened in this manner the sewage falls into a septic tank, constructed on the Dortmund principle, and thence it is sent laterally into a Scott-Moncrieff cultivation tank, through which it passes by upward filtration, to be distributed over a percolating filter, composed of coke or coal. The distribution is so arranged that a definite quantity of sewage is applied to every square yard of the filter in an intermittent manner, and the filter itself is composed of coke properly stacked, without any retaining-wall.

In closing this paper, let me pay one word of tribute to those who have through all ages endeavoured to work out the social problem of sewage purification. Some are known, but others, who have done yeoman service, are unknown, for the man of sense is the most self-conscious of craftsmen; he is unselfish in his outlook upon posterity, and only sometimes even tradition preserves, in an imperishable sketch, the memory of his triumph.

Discussion.

Dr. Hudson (New Zealand) would like to know had the Scott-Moncrieff system been in use in any locality for a lengthened period without being offensive?

Dr. Jas. Mason (New Zealand) testified to the satisfactory use of the septic-tank system in small communities, as they might be drained at little expense. The septic tank, however, was found of no use in abattoirs without precipitation treatment as well. As to these tanks in hospitals, care must be taken to keep the washings from the operating theatre. These tanks did not eliminate all pathogenic germs.

Dr. Storey showed how the septic tank was a failure at an hotel at Nowra, through the lack of care and attention.

Dr. Kendall, replying, said they had had the Scott-Moncrieff tank working in Sydney for over two years, and no one had ever complained of a smell arising from it. The cost for installation was £15. It was found inadvisable for refuse from a hospital to go through these tanks.

The President of the Section mentioned how the sewage of Chicago, with 1,000,000 people, was discharged into the waters of one of the tributaries of the Mississippi.

PUBLIC HEALTH IN NEW ZEALAND.

BY

J. M. Mason, M.D., F.C.S., D.P.H. (Camb.),

Chief Health Officer for New Zealand.

New Zealand, as you are aware, has been the scene of much experimental legislation. There it was that the dream of the old-world economists in respect to provision for old age was crystallised into an actual living fact. While politicians at home talked and discussed, a practicable and workable scheme was being born in this Britain of the southernmost seas. No longer need the worn-out human animal have to choose between the workhouse, with its consequent divorcement from all it holds dear, and starvation. There has been evolved a middle way, whereby comfort and independence may be assured to all those who have honestly borne the burden and heat of the day. Were it part of my brief, I could point you to many economic nettles which have been grasped, and grasped with safety, by the Parliament of New Zealand. The scope of my task, however, concerns the legislative enactments pertaining to public health which have been of late brought into force.

Previous to the passing of the Public Health Act of 1900, New Zealand, as far as health matters were concerned, was governed practically by the English Act of 1876. In place of the local government board, there was a Central Board of Health, which advised the Government in times of unusual danger. All of you who have worked under the Act at Home can well remember the constant desire for a weapon at once more wieldy and powerful. The ever-occurring "may," with all its loopholes, potential as well as evident, was a perpetual source of worry, producing a feeling somewhat akin to that of the bird in face of the serpent. The sense of restraint. and uncertainty as to the result of any action one might suggest, but could not enforce, militated very much against one's usefulness. All this has been swept aside in this the most complete and drastic Health Act of any English-speaking country.

The immediate casual agent in the framing and passing of this Act was the presence of plague in some of the States of the Commonwealth, coupled with the long, if not acutely-felt, necessity for some more vigorous and consistent supervision of matters sanitary. It says much for the good sense of both Houses that they were able to join hands in the face of a common enemy, and pass such a measure as the Public Health Act of 1900. The criticisms during its passage through Parliament were at all times sincere, and in many instances most valuable. With the exception of the sending of our contingents to help in the fight for freedom, never perhaps did an elected assembly more nearly approach that mood when "none were for a party, but all were for the State," than did these Senators last November.

Briefly put, the Act provides for a Minister of Public Health, who has Cabinet rank, a Chief Health Officer, and District Health Officers, who must all have special qualifications in sanitary science.

The colony is divided into six parts or provinces, each under the control of a District Health Officer, who acts under the Chief Health Officer, who in turn is responsible to the Minister of Public Health. Each District Health Officer has one or more sanitary inspectors under him, who all hold certificates from the Sanitary Institute in London or are master plumbers.. At Wellington there is a central pathological and chemical laboratory, and in each district a small laboratory is fitted up for the use of the District

Health Officer. The duties of a District Health Officer are to advise all local authorities in his district in reference to everything pertaining to public health, such as water-supply, drainage, &c.; he must see that the local authorities attend to the isolation of all infectious diseases, and the disinfection or destruction of all insanitary buildings. The onus of prosecuting such work is cast upon the local authority, and not upon the Central Health Department, and thus local patriotism or parochial pride is not interfered with. It has been found, however, in New Zealand, as in all other countries, that local authorities occasionally have evidenced a laxness in the undertaking or carrying out of sanitary reforms. In order to meet such cases, the pernicious "may" has in all instances been supplemented with the words "shall if the Chief or District Officer so directs." In this power of the Central Department lies plainly the chief safeguard against apathy, or it may be gross neglect on the part of a section of the community.

In order to check or prevent the spread of any dangerous infectious disease, the District Health Officer may, by report, recommend the local authority to exercise any function or power conferred upon it, by or under the Public Health Act or its local governing Act, and it shall be the duty of the local authority to faithfully carry out such recommendations, failing which the District Health Officer may cause such work to be done at the expense of the local authority. In cases of special emergency, *whereof he shall be the sole judge*, the District Health Officer may, without prior recommendation, undertake the work, and charge the local authority. Then again, if authorised by the Governor, the District Health Officer may, for the purpose of checking a dangerous disease, declare any land, building, or thing to be insanitary, and may forbid any insanitary building to be used or occupied for any purpose; cause any insanitary building to be pulled down, and the timber and other materials thereof to be destroyed or otherwise disposed of as he thinks fit; cause insanitary things to be destroyed or otherwise disposed of as he thinks fit; cause infected animals to be destroyed in such manner as he thinks fit; require persons to report themselves or submit themselves for medical examination at specified times and places; require persons, places, buildings, ships, animals, and things to be isolated, quarantined, or disinfected as he thinks fit; forbid persons, ships, animals, or things to come or be brought to any port or place in the health district from any port or place which is, or is supposed to be, infected with any dangerous infectious disease; forbid persons to leave the health district or the place in which they are isolated or quarantined until they have been medically examined and found to be free from dangerous infectious disease; forbid the removal of ships, animals, or things from the health district, or from one port or part thereof to another, or from the place where they are isolated or quarantined, until they have been examined and found to be free from infection; cause places, buildings, animals, and things to be inspected and examined; require animals, or any specified description thereof, to be kept only in specified parts of the health district, or not be kept at all within the health district, or within a specified distance outside the boundaries thereof; require watercourses and the sources of water-supply to be purified; forbid the discharge of sewage, drainage, or insanitary matter of any description into any watercourse, stream, lake, or source of water-supply, whether situate in the health district or outside the same; with the approval of the Minister, use or authorise the local authority to use as a temporary site for a special hospital or place of isolation or quarantine ground *any reserve or endowment* suitable for the purpose, whether the same is situate in the health district or outside the same, *notwithstanding that such use may conflict with any trusts, enactment, or condition affecting the reserve or endowment;* exercise any other power conferred upon him by the Governor.

The usual penalties are attached to interference with, or obstruction of, the District Health Officer or his delegates in respect to any such works.

Magistrates, Justices of the Peace, and Officers of Police and Customs are by statute enjoined to render all aid when called upon.

In addition to advision on sanitary matters, the District Health Officer is expected to examine and report upon all pathological specimens sent in by medical practitioners in his district.

You will note that in no way does the Health Department interfere with the Medical Officer of Health or sanitary inspectors of the various local authorities, so long as they follow what the Department considers the proper course.

As in other countries, the various infectious diseases are notifiable, but special penalties are attached to the non-notification by registered medical men of infectious disease, as will be seen by the following sub-sections:—"If the medical practitioner or chemist fails or neglects to duly give such notice to the District Health Officer, he shall be liable to a penalty not exceeding £10, and, on conviction, the convicting Court may also, if the disease is a dangerous infectious disease, suspend him from practice or business for any period not exceeding six months." "During the period of suspension the practitioner shall be deemed not to be a medical proctitioner, and the chemist shall be deemed not to be a registered pharmaceutical chemist."

Included amongst the notifiable diseases is tuberculosis. Of course, in respect to consumption, the same procedure is not necessary, and therefore is not followed, as in the case of, say, scarlet fever. The aim of the Hon. the Minister (Sir Joseph G. Ward) in making tuberculosis notifiable, was to be able to, in some manner, control all such cases. On a case of consumption being notified, the District Health Officer calls, and has a quiet talk with the patient and his friends. He points out that the main source of infection lies in the sputa of the infected person; he shows how this danger can be averted; he explains the necessity of (in advanced cases) separate beds; and very often the self-sacrificing wife is saved exposure to infection as a result of this quiet talk with the sufferer.

Special sanitoria are about to be built by the State for the treatment of consumption, and, as far as possible, cases in a clearly-infective stage of the disease are not permitted to land in New Zealand unless they can satisfy the Port Health Officer that they can afford to pay for such attendance and isolation as will preclude their being a danger to the lieges at large.

The department is desirous, and so far it has been successful, in ensuring that no unfair interference with the liberty of the subject shall result from this most important weapon for the check of consumption. It was realised to the full the very great necessity of administering this portion of our power in a spirit of charity and gentleness. To debar the outside world from the benefit of what I consider the finest country in the world for treatment of all debilitated states would be unfair, and possibly an infraction of that international comity and generosity for which all British possessions are justly famed; but, while this is true, it is also equally evident that to permit New Zealand to be made the dumping-ground of the indigent and incurable physical wrecks of the world at large would be to impose a burden upon, and expose our people to, a danger which no country should be called upon to bear or suffer. Should death or removal of the patient take place, the District Health Officer sees that the room is not re-let until it has been properly disinfected.

Not only are assured cases of infectious disease required to be notified, but "suspected cases" also. This I consider a most important point, especially as helping in the detection of such diseases as plague and smallpox, or the early stages of an epidemic. How great the danger is of waiting until the diagnosis is absolute, only those who have had to deal with these diseases can realise. When one bears in mind the various factors which are operating in the mind of the honest practitioner before he permits himself to notify,

say, a case of plague, as existing in a city hitherto untouched by that disease, it is not difficult to imagine that danger to the general public may result, if he be not strong in his desire to put all things beside the conservation of the general weal.

Another advantage arising from the introduction of the word "suspected" is that we are enabled to ask *all* who are likely to come across such cases to report—the householder, and the chemist who adventures outside his proper sphere, as chemists we know sometimes do.

It implies no power to diagnose that you ask the chemist to report when he "suspects" the existence of an infectious disease, and yet it assures the State of a zone of protection, the value of which is but rarely realised.

Another most important feature of the New Zealand Health Act is, that in all cases where a breach of any of its sections is made in respect to private property, the owner, as well as the occupier, is in every case liable. This at once does away with the bogus tenant, which landlords have been known to put forward as a defence in such cases.

Pollution of Streams and Rivers.

Much new and valuable machinery has been introduced in order to conserve the purity of our waterways, chiefly in the direction of settling the many disputes which so frequently arise among local authorities whose areas abut upon a common waterway.

The Governor may place, when he thinks it expedient in the interests of the public health, any specified watercourse, stream, lake, &c., under the sole control of one local authority, so that the Health Department has then only one body to deal with.

Sanitation of Native Settlements.

Profiting by the experience of other countries, New Zealand made special provision for the sanitation of the native settlements. Realising to the full the danger which always attends the introduction of a disease like plague among native races, a danger not confined alone to the Maori, but easily capable of spreading to the Pakeha, a very complete system of supervision over the various pahs was instituted. In addition to many and lengthened *koreros* with the principal chiefs, a Medical Officer of Health was appointed, whose sole duty has been, and is, to visit the various settlements, and instruct the natives in those matters which pertain to general health. In the carrying out of this scheme the Government had the good fortune to be able to avail themselves of the services of a Maori who is a duly registered medical practitioner. The advantage of sending one of their own blood amongst them, one able to enter into their thoughts, prejudices, and likes, one who, so to speak, may be expected to join the wisdom of the East with that of the West, seemed great, and the result has justified the expense. With regard to noxious trades, unsound food, &c., the alterations may be summed up in that all things have been made easier by the Public Health Act of 1900.

Quarantine.

The part of the Act which has for its end the protection of the colony against the introduction of infectious disease is very complete, and is set out in Sections 103 to 136. Briefly stated, while amply provided with regulation for the treatment of ships, &c., arriving with infectious disease on board, we rely mainly upon careful inspection rather than quarantine. The Port Health Officer has instructions to make careful and thorough inspection of all vessels coming from infected ports. Only when disease is present, or he suspects there is infectious disease on board, is there any delay.

An excellent understanding has been arrived at between the Department and the various shipping companies whereby they agree to report *all illnesses* of whatever nature to the Health Department. This lessens the gravity of the Port Health Officer's work very much, as in place of antagonism, or, at the best, passivity, he finds in the various officers real helpers.

The only discord in this otherwise harmonious measure is to be found in the part that relates to vaccination, although here even some good may be found. Arm-to-arm vaccination has been abolished, and only pure calf-lymph, which can be had free of charge, may be used.

Following the Home Government, the "conscientious objector" has been allowed to appear, with the usual result.

I do not know what relation the vaccinated hold to the unvaccinated in the other colonies, but I am sorry to say that New Zealand must be classed as a very unprotected country. Firmly as I believe in the value of vaccination, I am not one to decry the man with a conscientious objection; what I deplore is the conscienceless way in which people avail themselves of this exemption clause simply because they have considered the matter only from a sentimental point of view. It is futile, however, for us to hope to work too far ahead of public opinion. Let us trust that should smallpox appear, that we sanitarians may be permitted time to protect even these unbelievers.

There is little hope, I fear, of our being able to persuade any Government to rescind the conscience clause in the Vaccination Act; but it is nevertheless our duty to lay clearly before our respective employers the dangers attendant upon the neglect of vaccination.

Gentlemen, I have little further to say. I have drawn your attention to the main features of our Public Health Act. So far, great and autocratic as the powers vested in the officers are, there has been no friction. By the use of powers no more brutal than persuasion, we have already been able to effect numerous and important reforms. Much of the smoothness of the working is due to the sympathy and unstinted interest taken in sanitary matters by those in authority.

THE DIMINUTION OF WATER-BORNE DISEASE IN CAMPAIGNS.

BY

W. L'Estrange Eames, M.B., C.L.B. (Dub.), Newcastle.

Ever since advancing civilisation has endeavoured to humanise warfare, and thoughtful care and nursing have been provided to alleviate the suffering of the sick and wounded, the mortality from cases has been considerably reduced; but the number of sick casualties occurring to-day, with all our advance in knowledge of the causes and avenues of disease, compared with the number of sick casualties in former campaigns, when our knowledge was not so great, shows little, if any, reduction, and sickness is as great a factor to-day in determining the effective strength of a force, other things being equal, as it was a hundred years ago. Now it will be allowed on all hands that this should not be; but the fact remains that it is so. Take this present South African war. The War Office returns up to the end of September, 1901, kindly supplied me by Surgeon-General Stevenson, C.B.:—

Total reduction of the field force:—

	Officers.	Men.
Killed in action	416	4,341
Died of wounds	132	1,491
Prisoners who have died in captivity	4	93
Died of disease	257	10,293
Accidental deaths	15	430
Missing and prisoners	7	613
Sent home wounded	—	7,105
Sent home sick	2,439	47,181
Not specified which	—	745
	3,270	72,292

Total of all ranks .... 75,562.

Loss to the Army from Disease:—

Deaths from disease	10,293
Sent home as invalids after sickness	49,000

Approximately 60,000 out of the 75,562.

In this number no account is taken of all the non-efficients in hospital. Of the deaths from disease, enteric accounting for 6086 out of some 27,649 cases amongst the non-commissioned officers and men. I could get no returns as to dysentery and diarrhœa, but any medical officer who has been to the front will endorse the statement that fully 50 per cent. of the non-efficients are caused by these three diseases, enteric, dysentery, and diarrhœa. Now these, with cholera, are the four diseases that have played most havoc with our fighting forces in India. From the above figures it will be seen that disease is many times more dangerous to the soldier than the enemy, and if some means could be adopted for minimising this evil, which would at the same time answer service conditions, then an immense advance in the humanising of warfare will have been made.

Cholera, enteric, dysentery, and diarrhœa are, we know, spread principally by means of the drinking water, which by some means or other has become

polluted and infected; and occasionally also through the agency of dust and flies. These diseases arise, we know, in consequence of the presence of certain special organisms in excrementitions and other waste matters, which are carried by some means or other into the water-supply. We likewise know that water polluted with sewage and infective germs may be drunk with impunity, provided it is sterilised, that is, all the bacterial life in it destroyed. This can be effected in several ways:—

1. By heating the water at 60 centigrade for ten minutes.
2. By filtration through special filters.
3. By using certain chemical re-agents.

Now all of these methods have been used to a certain extent, and in some instances with success, but on the whole failure.

Sanitary officers have been tried, but with no better results, and Field-Marshal Viscount Wolseley, K.P., G.C.B., G.C.M.G., in his "Soldiers' Handbook," writes as follows:—"The sanitary officer is the creation of recent years, and as a general rule is a very useless functionary. In the numerous campaigns where I have served with a sanitary officer I can conscientiously state I have never known him make any useful suggestions; whereas I have known him to make many silly ones," &c.

It is not the fault of the sanitary officer that failure has occurred, as I will show presently. Many Enteric Commissions have sat and made recommendations, and the last Enteric Commission from South Africa has just sent in its report. We hope that good will follow.

This matter is sufficiently serious in well-watered countries, but campaigns in the East, where the conditions are bad, have invariably proved disastrous, and we know what to expect in a badly-watered country like Australia, unless provision is made to meet the evil. An inquiry into the cause of failure shows that, while it is the custom to educate and train the soldier individually and collectively to fight the enemy, no attempt has been made to arm or train him, at any rate individually, to fight water-borne diseases, which are many times more dangerous to him than the armed foe.

It is practically equivalent to marching totally unarmed troops against a well-armed enemy, with a few big guns roaring defiance in your rear, and then to wonder that the result is disastrous.

Our scientific knowledge, sanitary officers, filters, &c., answer to the big guns; but the rank and file are totally unarmed to meet their insidious foe, which we have seen is many times more dangerous than the armed enemy. To succeed, we must arm every man with a, so to speak, "sanitary rifle and ammunition." If this interfered in any way with his efficiency as a soldier, or did not answer service conditions, I know it would be useless to bring the matter forward; but when, on the other hand, service conditions can be complied with, and the soldier armed with the necessary knowledge to avoid most diseases without in any way interfering with his fighting efficiency, I think it is at any rate worthy of a trial.

The soldier's sanitary rifle merely consists in learning a simple sanitary drill, which will teach him the necessity for adopting a few precautions; also how to sterilise water before drinking it. As a matter of routine the service should undertake the supplying of water for drinking purposes sterilised. This has been attempted by the use of filters, but these have proved a failure, because they are too slow and troublesome to answer service conditions, and are practically useless when dealing with muddy waters. The sterilisation of water by chemical means on a large scale would not answer, for many reasons; but for emergency purposes I cannot conceive anything that could possibly answer service conditions better, provided a re-agent can be found that will effectually sterilise infected water without

rendering it harmful and unpalatable. Such a re-agent has been recommended by Rrs. Rideal and Parkes in acid bisulphate of soda, 15 grs. of which will sterilise one pint of water infected with the germs of cholera, enteric, &c., in half an hour. These are put up in compressed tabloids of 5 grs. each, and every soldier could be provided with small bottles containing one hundred tabloids. For the supply of water on a large scale, and as a matter of routine for supply to troops, I am of opinion that heat will prove most satisfactory, and can be made to answer service conditions more nearly than any other method. I have given this matter considerable attention, and tested it under service conditions, and what I venture to suggest is the sterilisation of the water in the water-cart itself. In June, 1900, in Pretoria, I had an apparatus made at my direction by Private Seguss, of No. 2 Bearer Company, out of some old iron-piping. With this apparatus placed in the ordinary cooking fire, and connected to the water-cart by two attachments, all the water, about 110 gallons, in the cart, was sterilised in about two hours. This apparatus I have since improved upon, and, after numerous experiments, altered to its present shape. The heat can be supplied by any kind of fuel—a very necessary provision on service.

Its weight is nominal, it is inexpensive, and does not require a trained man to use, and it will sterilise all the water in a cart, about 110 gallons, in about two hours. By a ball-cock attached to the discharge pipe, in a few minutes after placing the apparatus in the fire, the sterilised water may be drawn off, if necessary, for filling water-bottles, and the same arrangement permits of sterilisation taking place, whatever the level of the water is in the cart. Whenever the number of men in a detachment is too small to be provided with a water-cart, it will be necessary to use the cooking pots, or even their own pannikins, for the purpose of sterilising water, and, in the event of being unable to do this, to fall back on their emergency tabloid. Of course, exception may be taken that in a campaign such as is taking place in South Africa the question of fuel is a serious objection. This is undoubtedly so; but during a day's march, if the native drivers with a column are utilised, enough dried cowdung can be collected for the purpose.

Scheme for the Diminution of Water-borne Diseases in War.

1. Hygienic drill, to be learnt by heart by every man.
2. Instruction of officers in field sanitation, hygiene, and preventive medicine.
3. Drinking-water for troops to be supplied sterilised.
4. Emergency tabloids for sterilising water to be supplied.
5. The pay of the soldier to be as follows:—So much a day for service. So much bonus for every day of efficiency. A man incapacitated from wounds to be entitled to the bonus, but not from sickness.

Hygienic Drill (suggested).

Cholera, enteric, diarrhœa, and dysentery are caused by drinking polluted water, which may be avoided by sterilising the water before drinking. This will usually be done before issue, but, if not, everyone will be careful to boil it before using, or, if that is impracticable, will place in his full water-bottle three emergency tabloids. In half an hour the water will be fit for drinking.

Latrines: Soldiers will be careful to always use latrines in camp, and not to soil the ground elsewhere. On the march a hole will be utilised, and earth thrown over afterwards.

Water: Care will be taken not to pollute any water, whether still or running, with excrement, urine, dead animals, or other refuse. All such

will be deposited on ground that does not drain into pools or streams, and covered with a few shovelfuls of earth.

Food and meat will be covered up, to protect them from flies and dust, which are often conveyers of disease. All vegetables eaten uncooked should be washed in sterilised water.

All departures from health should be reported immediately, as a dose of medicine taken early will often prevent more serious trouble.

N.B.—A soldier's pay is so much a day, but a bonus of so much a day will be paid for every day of efficiency, which ceases immediately a man is inefficient from sickness. This will not apply in case of a wounded soldier, who will draw the bonus.

Training of Officers.—Water: Sources of collection, storage, &c. Purification. Diseases produced by impure water. Refuse: Collection, removal, and disposal of excretal and other refuse, dead animals, &c. Air and ventilation. Climate and meteorology. Exercise and clothing. Food and beverage. The prevention of communicable diseases. Prizes or rewards should be given at the end of every campaign to those company officers who have taken their men through the campaign with the smallest percentage of non-efficients from disease.

Dr. Eames then read a letter as follows:—"I have on two separate occasions had an opportunity of seeing Major Eames's apparatus for sterilising water under working conditions. On the first occasion the heating apparatus was placed on the ground near the A.M.C. water-cart. The fuel used was some sticks of wood, and ordinary dry cowdung. Water at the ordinary temperature was turned on into the water-cart, the fire was lighted with a match, and in less than ten minutes' time water was drawn off at a temperature of 91° C. (about 195° Faht.).

"On the second occasion an improved heating apparatus was used, attached to the cart, so as to work on the march. The fuel used was the same. In four and a half minutes water at a temperature of 140° F. was drawn off, and in ten minutes the temperature had risen to 180° F. These tests I consider eminently satisfactory, so far as the heating effect is concerned. Some minor improvements in the details of the apparatus would still further increase its value.

"The apparatus is not of great weight, and can be attached to any ordinary service water-cart, or even to ordinary barrels. The fuel can be obtained anywhere.

"I have no doubt that for camps, field hospitals, &c., the apparatus is excellent. Of course, I cannot say how service conditions, &c., in South Africa may affect its efficiency, but I see no reason to doubt that we have now advanced considerably in our means of providing sterilised water for our troops. I hope Major Eames's invention may have a fair trial in the field before the termination of the war in South Africa.—(Signed) G. Lane Mullins."

Discussion.

Dr. Morgan Martin (Sydney), who had been in the campaign, warmly commended Dr. Eames's paper and the apparatus of his invention.

Dr. Ham said that if anything had been proven during the campaign in South Africa, it was that the bacillus was more deadly than the bullet, and the microbe than the Mauser. As he found when in the "Guards" in London, it was very difficult to make Tommy Atkins a sanitary unit. (Hear, hear.) They, however, knew what good work Dr. Eames had done during the campaign, and had confidence in his invention.

Dr. McDouall and the President warmly complimented Dr. Eames, and he was accorded a hearty vote of thanks.

THE DEFECTS OF THE VICTORIAN ASYLUMS AND THEIR REMEDIES.

BY

A. S. Joske, M.D.

The experience of some eight years as official visitor of the metropolitan asylums of Victoria, and an extended visit to the asylums of New South Wales some two years ago, has induced me to lay briefly before you some of the defects that arise from the present system of asylum management in Victoria, and the means that should be taken to remedy them.

The metropolitan asylums of Victoria are situated near Melbourne, and are contiguous to one another. They contain nearly 2000 patients, out of a total numbering 4400 patients confined in Victoria. These patients are confined in two different asylums, known as Kew and Yarra Bend respectively.

Kew is almost a type of a barrack-system management, but has attached to it a system of buildings of the best type for the accommodation of idiot children. These buildings, which are completely separate from the main building, consist of detached cottages. Some of the cottages are old in type, but there are a number of new wards, which are most excellent in design, construction, and usefulness. This idiot asylum, as I have already said, is independent. It has an independent staff for nursing and instruction, it has its own cooking and feeding arrangements, and is under the competent head of the Inspector of the Department himself. He has under him what is wanting in all the asylums of Victoria—a skilled trained female nurse, who acts as matron, and has under her a number of nurses and trainees, who teach and instruct the idiot children according to the most approved modern methods. On the male side there is a similar system. At the head, a male inspector, who has had special training, and who has under him also attendants and probationers according to the number of children treated. The instruction not only consists of school work, but also a number of trades are taught and practised.

Kew main asylum consists of a large barrack building. This building as erected is deficient in many essential principles. It has no hospital accommodation in the proper sense of the term. It has not sufficient sleeping accommodation. It has an insufficient amount of day rooms, and the corridors of the wards are used as dining-rooms owing to there being no proper dining accommodation. The ventilation is defective in a number of wards. But in spite of this, it is maintained in a fair standard of efficiency. The receiving wards at Kew are practically also the accommodation used for the better class of patients whose friends pay for them; this is utterly wrong. The yard accommodation attached to this ward is bad, but this applies to most of the yards of the male side. The airing-yards of the female wards, however, show a distinct improvement.

Yarra Bend consists of a series of detached buildings. The male hospital is—as I am glad to tell you—detached, and has many advantages over that of Kew, but still is not a modern hospital in any sense of the term. The main building in the male enclosure consists of two large barrack buildings, with most defective accommodation. In connection with these buildings are some small wards, but at night-time, owing to practically no ventilation, they become veritable "Black Holes of Calcutta." I have a lively recollection of visiting these wards on a hot summer's night at 11 p.m.; words cannot describe their condition. The rest of the male asylum consists of a series of detached cottages for the quieter class of patients. The accommodation in these is very much better than in the barrack buildings. The female division consists of three bluestone buildings, with very fair yard accommodation, and

a lot of detached wooden buildings for the quieter patients. These are certainly good from a ventilation point of view, but hideously dangerous from a fire point.

I have given you these brief details so that you may understand roughly the difficulties the authorities have to deal with. Owing to the lamentable lack of pence in Victoria for the last ten years, all the buildings have suffered greatly from want of proper maintenance.

The staff of the asylum is recouped from the ordinary Public Service. Until recently there has been no training school, and no training was given for male or female attendants. The result is that the staff has not been kept up to the form of a modern hospital, and an asylum of insane people should be looked upon as a hospital, and should have its staff consist of highly-trained male and female nurses. The asylum should be controlled by its superintendent. His powers should be such that his influence for good is felt through the whole asylum. A lax superintendent makes lax medical officers and attendants, and not only does the discipline of the asylum suffer, but so also do the patients, who should be the first consideration. The superintendent of an asylum should be held responsible for all that takes place in an asylum. He should have the powers of supervision that a captain has of his ship at sea, and he should be responsible for what he does and for what takes place in his asylum to his owners, the public. The question is: who should represent the public, so that it may be assured that fair play, and not, despotism, is given to the patients and to the male and female nurses and attendants who loo kafter them? In our Victorian asylums for years past the court of final appeal for supposed wrong-doing on the part of attendants has been the Public Service Board. This Board in the past has failed lamentably to uphold discipline. A recent well-known case is the Sunbury enquiry, where an attendant who admitted that he was to blame for a patient committing suicide was exonerated for his action.

What is the best remedy in place of a Public Service Board? In England and America it has been found that a permanent small Board of Commissioners, to which all cases of neglect and omission can be referred, has been found to work excellently. The Board should not be too great, but should consist of three or four members who are skilled, used to judging and used to asylum methods, and who can form fair judgments and give fair decisions. The Minister of the day should possibly have the power of final appeal. If this were done, it would certainly prevent the miscarriage of justice that has taken place in the past. Given your Board of Commissioners and your superintendent with increased powers, you need a body of senior and junior medical men to carry on the work of treatment. These men should be paid such salaries that the good men who come into the service have some inducement to remain, and not run away after a short period, and disorganise the department. The male and female nursing staff should be trained, and merit, and not service only, should be the means of progression in the department. The department, I am proud to say, contains many excellent, good, useful, and efficient servants, but with an increased standard they will become more efficient. The only method of doing this is to insist that every new applicant for admission as a male or female nurse has to undergo a training of at least three years, and should have to pass at least two examinations of efficiency—theoretical as well as practical—so that the skill in the handling of a patient is increased by the knowledge of what the patient is suffering from, and the treatment given is not a mere rule of thumb, but scientific. The hospital wards of each asylum should be controlled at once by trained nurses. Lectures should be given and examinations should be held, but the lecturers and examiners should not be taken altogether from the staff. The staff has its time taken up quite enough in treatment and management, and outside teaching and examination would add a fresh impulse to

probationers and trainees doing their best. The nurses on both sides of each asylum should be distinctly and uniformly clad. The outward appearance of the asylums, when compared with some of the New South Wales ones, have been much neglected.

Outlay and care could make the Yarra Bend especially a perfect garden. The need of making distinction between the better-class patient and the ordinary unfortunate is very pressing. It is unfair that the friends of patients who are willing to pay for somewhat better accommodation should have no proper place to send them to. This leads to a variety of misfortunes. People send their friends out of the State, where they cannot see them, and the system leads to a formation of a number of illegitimate asylums, where there is no proper official supervision and inspection, and which may lead to many scandals. It is not right and proper that patients who are acutely, chronicly, or mentally ill should be placed where they are not properly safeguarded. The New South Wales authorities provide most comfortable cottages, with beautiful surroundings, for their better-class patient. To my mind, a series of detached cottages to hold a varying number of patients, is the proper system, and these should be placed in pleasing and airy surroundings, where gardening and light work could be carried on by the patients under separate medical officers.

The receiving and observation ward in Sydney serves a great and good purpose. It is very gratifying to know that our Victorian Chief Secretary has made a beginning in this direction. The system of out-door work and occupation practised in Victorian asylums is more marked than in New South Wales, and so causes a certain drain on the attendants who are left to wait upon those patients remaining in the main buildings. It always seems to me that a proportion of one attendant to ten patients is quite sufficient. Personally, I have never heard any complaints from attendants that the strain on them was too great.

Summed up briefly, what is needed to make Victorian asylums equal to any is:—

1. An efficient body of Commissioners, instead of the present Public Service Board.
2. Official visitors, whose powers might be somewhat extended.
3. The superintendent of each asylum should be held personally responsible for what goes on in his asylum.
4. The medical staff should be increased and properly paid. One medical officer to 200 patients is quite little enough if records of cases are to be kept and scientific notes to be published.
5. All male and female nurses should be efficiently trained and distinctly clad.
6. All pay-patients should be properly housed and separately treated.
7. All patients should be properly subdivided.
8. Each and every asylum should have a proper and separate hospital and dispensary.
9. The beautifying and adorning of all buildings should be much encouraged.
10. A receiving ward should be promptly pushed on with.
11. Private asylums and treating insane in private hospitals should be rigorously abolished.
12. The name of Lunatic Asylum should be done away with. Hospital for Insane should be used instead.
13. Warders should not be known as warders, but as male and female attendants and nurses.
14. Gradually the old barrack buildings should be altered, so that corridors are kept as corridors, dining-rooms should be used as

dining-rooms, and obstructions to ventilation should be removed. To do this properly, a special architect should be attached to the department, who should do the work of repairing and rebuilding what may be considered necessary by the Commissioners, instead of letting the money that is allocated for repairs filter through the Public Service Department.

If these reforms were carried out, I think it would be safe to say that in ten years' time the Victorian system of asylums would be equal to any in the world.

Discussion.

Dr. Steel (Ballarat): The nurses and attendants should be trained by the medical officers of the asylums, and not by outside practitioners, as recommended, because the more the staff are brought under the direct supervision of the officers the better the discipline obtained. One nurse to ten patients is not sufficient in some of the institutions. For instance, in the Epileptic Asylum at Ballarat the institution would be almost unworkable unless the number had been increased to one to eight.

Dr. Lovegrove (Perth, W.A.) agreed generally with the views of Dr. Joske, and remarked that for years past the attendants in West Australian asylums had been called attendants, and not warders. He was sorry to learn that the area of the land originally attached to one of the Melbourne asylums had been much reduced, which he found would result to the detriment of the patients. He expressed the opinion that it was most desirable in selecting sites for new asylums to have them at a considerable distance from large towns, say twenty miles, to minimise, as far as possible, the chances of the area being reduced in after years on account of its value for building or other purposes. Inspector-General Manning, of New South Wales, had some years ago impressed upon him the desirability of obtaining an acre for every patient a new institution was designed to accommodate, and his recent experiences had convinced him that the late Inspector-General's views were correct. Dr. Lovegrove also, with Dr. Joske, dwelt on the importance of pleasant surroundings at asylums.

Dr. H. C. McDouall said: As regards the necessary lectures to the nurses and attendants, these can be better and more efficiently carried out by the medical officers of the hospital than by outside doctors. The course of instruction should extend over two years at least, examinations being held at the close of each teaching course. These examinations are also, on the whole, more satisfactorily carried out by members of the medical staff of the department than by outside medical men. Uniform for the nurses and attendants is essential to a properly-equipped and up-to-date hospital for the insane. It not only aids in maintaining the discipline of the service, but is of further practical utility in readily differentiating between patients and the nursing staff. A system of uniform clothing for the patients is not to be recommended, except, perhaps, in the case of institutions for the care of imbeciles. Among other objections to its adoption are to be especially noted: its tendency to emphasise that loss of individuality which unavoidably occurs when numbers of people are brought together and subjected to fixed rules and habits of every-day life, which tendency to loss of individuality and spontaneity is especially noticeable in insane patients after lengthy detention, and is a factor of importance in unfitting them to again take their places in the world outside in the event of their cure. The area of ground requisite for the adequate treatment of the insane depends partly on the nature of the cases to be treated. Recent and acute cases being probably treated fairly efficiently on a restricted area, and more particularly on the nature and

natural fertility of the soil of the site selected. This site should not be any considerable distance from a fairly large centre of population, say not more than three to four miles, and this for two reasons in particular:—(1) The increased cost of maintenance of a remoter locality; (2) the practical necessity of affording the nursing staff ready opportunity of mixing with sane people outside during their hours off duty. As regards ventilation, there is no practical difficulty in securing this in Australia for the day-rooms and ordinary dormitories, but as regards the efficient ventilation of single rooms, used for violent patients, this is at present far from being carried out, and it will probably remain a great blot in our hospital construction till an adequate system of ventilation by fan-propulsion or exhaustion is adopted.

NOTES ON A MILK EPIDEMIC OF TYPHOID, ILLUSTRATING THE DURATION OF INFECTIVITY.

BY

James Jamieson, M.D.,

Health Officer, City of Melbourne.

As is often the case with new knowledge, the gaining of more exact information about the intimate nature of the acute infective diseases seems for a time to bring in almost as much doubt as certainty. It may be, of course, that the old supposed certainty was based on real ignorance, and that the new doubt marks only a temporary halting-place on the path of scientific progress. This is notably true in the case of diphtheria. For, while exactness has been given to diagnosis by the discovery of the bacillus of Lœffler, it is also true that in cases which look like diphtheria clinically the real bacillus may not be found; and further, that the bacillus is not uncommonly discovered where there are not clinical signs of the disease. In respect of prophylaxis the gain is unmistakably great.

With regard to typhoid, the present position is distinctly an interesting one. The relation of Eberth's bacillus to the disease is definitely accepted, although the distinctive characters of the organism, as against varieties of the colon bacillus, are not easily definable. It is especially, however, in respect to the duration of the period of infectivity, that fresh light was needed, and has to some extent lately come. It is owing largely to the strenuous advocacy of Budd, that the doctrine as to the spread of infection mainly, if not solely, by means of the stools of patients suffering from the disease came to be almost universally accepted. The demonstrated presence of the bacillus in the structures of the intestinal wall, and in the fæcal contents, went to establish the contention of Budd and his followers, which had been based on practical observation. But difficulties arose, and there came to be agreement among bacteriologists that, while the bacillus is very frequently discoverable in the fæces at an early stage of the disease, it is difficult or impossible to identify it at a later period. That being so, the old question about the length of time during which the discharge of typhoid patients may be the means of spreading the disease was evidently not made easier of solution—at least, for the time. And the question has always been answered in a somewhat uncertain way. The infective period was supposed to last till the temperature had definitely fallen to the normal point; till convalescence was established; or till an assumed ulceration could be supposed to have healed up finally. Clearly there were uncertainties in all these respects, and so authorities had a way of avoiding positive expressions of opinion on this most important point. As it became known that the bacillus either ceases to occur in the fæces, or can with difficulty be detected, it was also clearly shown that it may remain lodged in the body for quite long periods after recovery from an attack of the disease. In his Goulstonian Lectures, published in the *Lancet*, in March and April, 1900, Dr. F. Horton-Smith discussed very fully the evidence as to the persistence of the bacillus after recovery, and notably in the urine. His own observations showed that the urine may contain the bacilli, in enormous numbers, at least as late as the seventieth day of the disease, and he makes reference to a case in which they were believed to have persisted for several years. His own belief was that seventy days by no means marked the maximum duration. In the present state of our knowledge, therefore, we seem to be driven to the opinion that the disease is more liable to be spread by contaminated urine than by

fæcal discharges, especially at a late period of an attack, and even after apparent establishment of full convalescence.

But though observations such as those recorded by Dr. Horton-Smith and others carry conviction to a very large extent, it is both interesting and important to get evidence of actual infection, as helping to fix the duration of the period of infectivity.

A series of cases, occurring among the customers of a dairy in the City of Melbourne, supplies some points of interest in this connection.

S.B., the keeper of the dairy, was removed to the hospital on 6th December, 1900, on what was considered to be the sixth day of his illness. He remained in hospital till January 15, 1901, the trade having in the meantime been carried on after precautions taken, and without any consumers of the milk having been reported as affected. He went home from the hospital, and declared that he did no work about the dairy for several weeks. On the 11th of March, the first of a series of six cases was reported, the others occurring in pretty rapid succession. The calculated dates of attack were the 4th, 5th, 11th, 12th, 19th, and 21st March, the last case being that of a brother of the proprietor, who lived and worked on the premises. In the time which elapsed between the first and last of these notifications, only sixteen other cases were reported from the whole district with a population of about 67,000.

There was another circumstance which made more definite the attribution of the outbreak to the milk-supply. A list of the customers was obtained, showing that one hundred and fifty-four households were supplied, and it was found that in most instances the milk was scalded before delivery, but that twenty-two householders preferred to obtain the milk fresh. All the cases outside of the dairy occurred among persons belonging to these households.

In various ways the history of this small outbreak was an interesting one. The man who is assumed to have distributed the infection had not an unusually severe attack, judging from the period of stay in hospital, though his ability to take up work was delayed by an attack of pleurisy. His illness apparently began on 1st December, and the last cases among his customers occurred on 11th, 12th, and 19th March, so that even allowing fourteen days of incubation, full three months elapsed between the beginning of his illness and actual infection in these cases. As soon as suspicion was excited precautions were at once taken, and when the second case occurred on 21st March these were renewed, and the outbreak, so far as concerned this focus of infection, was at an end. And warning was further taken, and return to work on the part of this patient was prohibited for three months after discharge from the hospital. This was perhaps a straining of powers, since the maximum time of seclusion contemplated by the Victorian Health Act is fixed at three months. It is not stated, of course, at what date or stage of illness the period of three months begins to count, and advantage may thus be taken of this vagueness. With the knowledge we now have of the duration of infectivity, in more than one of the infectious disease, it is apparent that the limit of three months, whether from the beginning of the attack or from the establishment of convalescence, does not err on the side of over strictness.

SOME NOTES OF A CASE OF MOLLUSCUM FIBROSUM, WITH DEMENTIA.

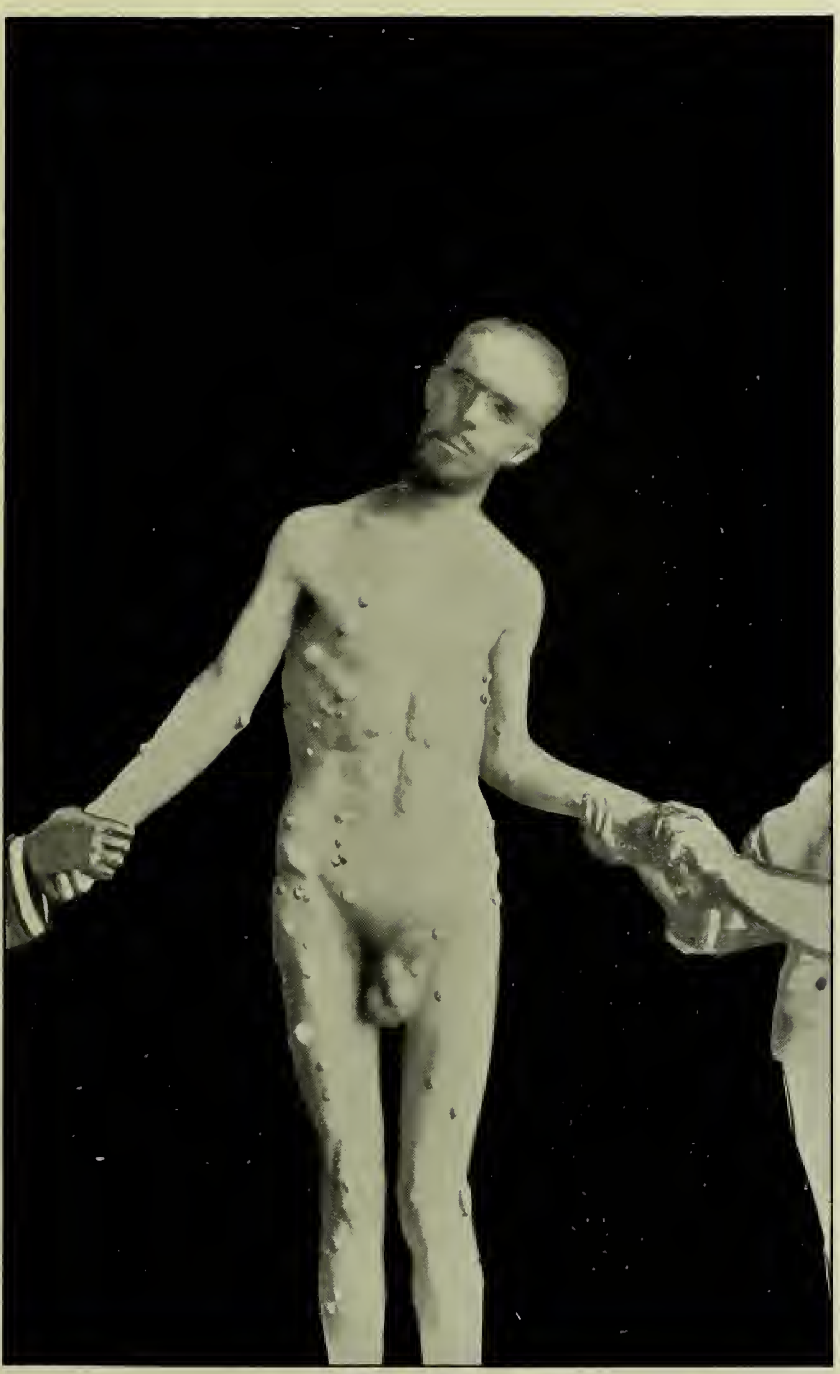
BY

A. S. Joske, M.D.,

Hon. Surgeon to the Alfred Hospital Melbourne; Official Visitor, Metropolitan Asylum of Victoria.

T.L., aged 27, single, was admitted into the Yarra Bend Asylum on November 12, 1896. On admission he was dull an stupid, and deficient in intellect. He was quiet in demeanour, and was covered with a very large number of fibrous growths all over the surface of the body and arms and legs. Some of the growths were very big—as large as a pigeon's egg. He could give no proper account of how the growths had come, and his friends were also unable to state definitely when they commenced to grow, but thought they had been present for some years, and had decreased in size somewhat in the last twelve months. His bodily condition was fair, and he took food fairly well. In 1897 and 1898 he became wasted, and sometimes took fits, but had no treatment beyond being placed in the Asylum hospital from time to time. The growths remained the same in appearance. A small piece of one was removed, and examined microscopically, but revealed nothing but fibrous and gelatinous tissue. He had no growths on the mucous membranes of his mouth or soft palate. He remained in much the same condition up till five months before his death, when his lungs began to show signs of tubercular disease; the growths, however, of which there were over two hundred, remaining in much the same condition, neither increasing nor diminishing in size. He died on November 18, 1899, and post-mortem examination showed tubercular disease of boths lungs and bowels. In addition he had a small glioma in the posterior region of the left frontal lobe.

I present this case to you because of the rareness of the condition, especially when combined with the dementia. I append photographs which show somewhat badly the large number of fibrous growths over his body and limbs.



Case of Molluscum Fibrosum.
(Front View.)

Case of Molluscum Fibrosum.
(Back View.)

QUARANTINE MATTERS.

BY

J. M. Mason, M.D., Chief Health Officer for New Zealand.

Realising, as we must do, that protection against outside infectious disease can be purchased at too great a cost—that we must, as a matter of fact, consider the commercial aspect of the question as well as the purely sanitary one; it seems to me that this discussion may serve a very useful purpose.

If we had no need for the outside world—if we were like the London suburban residence, "self-contained," so to speak—we might close our doors, and thus exclude disease among other things. This, of course, is out of the question, and what we public health officials have to do—the rule which we should ever keep before us— is, "How to secure the greatest safety with the least possible interference with trade."

The difficulty of framing a regulation which will be at once suitable for two such diverse diseases as plague and smallpox, are great, if not impossible. To persist in the detention of passengers beyond the time required to make a complete and thorough examination of their personal condition is, I consider, unwise, especially in the case of such a disease as plague, which, except in the pneumonic form, is little more infectious than enteric fever. On the other hand, smallpox, which we must class as a disease of the greatest infectivity, must necessarily be treated differently. If our people were all, or nearly all, vaccinated, our difficulties would be greatly lessened. The first point, therefore, which I would emphasise, is the absolute necessity for a differential treatment of ships arriving from an infected port. Another important factor which must be taken into consideration before deciding upon your plan of campaign is, does the disease you are trying to keep out exist in any form whatever within the country you are trying to protect? To ensure that such a disease as rabies should not be introduced into a country, almost any steps are justifiable; but, to impose restrictions which are likely to cause great loss against such a disease as plague, is, in my mind, futile and unwise. If it were possible by any system of quarantine to keep out infected rodents, then, by all means, let us adopt it, if the cost be not too great. Smallpox we have not got, and much graver interference with commerce can be justified in our endeavour to keep our countries free from it. More efficient vaccination would, of course, be our best coat of armour to wear, and it may be that the so-called conscientious objector will understand an argument based upon pounds, shillings, and pence, if he be able to turn a deaf ear to our warnings in time of peace.

In New Zealand, our procedure is to deal with each disease according to its gravity in our eyes; to rely upon careful inspection during daylight; and to as far as possible relegate quarantine to its proper sphere, namely, a weapon to be but rarely used, and only then as a last resource.

We have instituted a system of medical inspection which secures almost absolute safety, and yet imposes no restriction upon the movements of passengers.

Discussion.

Dr. Ham (Queensland) said he understood the question to be considered was—"Medical Inspection as against Quarantine." Medical inspection was all right in Great Britain. Such a system required a large, highly-organised, and well-trained body of officials, health authorities, medical authorities, and police authorities. The system worked well in England, but would it do so here? In Australasia the staffs would be numerically small, and a large

extent of country had to be travelled over that was difficult of access, and which offered no hope of tracing passengers. He would be glad to fall in with a scheme of medical inspection if it could be made effective, and properly carried out. But until such a scheme could be established they must proceed cautiously.

Dr. Lovegrove agreed in the main with the remarks made by Dr. Mason, of New Zealand. Great injury was done to commerce by what is generally known as quarantine. He (Dr. Lovegrove) had, however, previously expressed himself to the effect, and he took this opportunity of doing so again. that commerce, as represented by large steamship companies, had, to a very considerable extent (so far as smallpox was concerned), the power to protect itself, by insisting upon vaccination of all passengers and members of the crew at the various ports of embarkation. If such a system were adopted by all owners of ships, there would be little cause to fear the importation of this dire disease into the Commonwealth. In regard to plague, all he would say was, its prevention rested largely with the boards of health. If greater care was exercised by them in seeing that our ports were kept clear of rats and other rodents subject to the disease, and strict attention given to the removal of all filth and decaying matter, the people of Australia need have little apprehension in this regard. Loss to commerce, however, must occasionally continue to result until the people of the Federated States are prepared to adopt the system of surveillance of contacts, and isolation only of cases as carried out in England (a system which he, himself, much favoured), he could suggest no better method of quarantine than that now provided.

Mr. Mault, being called on to speak by the President of the Section, expressed his general agreement with Dr. Mason's views on the subject of quarantine so far as plague is concerned, and in regarding smallpox as the disease that required the most special precautions. He did not think Dr. Burnett Ham, in his short sketch of the history of quarantine, had done England justice in saying that she had been chiefly actuated by commercial considerations when she discarded quarantine and adopted medical inspection, for the English government health officers and medical advisers had based their advice to the government on the proved failure of quarantine from a medical point of view; and at the International Conferences on quarantine the English representatives had defended medical inspection by similar arguments, and had called attention to the false sense of security that was engendered by depending upon a system of quarantine that would inevitably break down—as it always had done—instead of depending upon making due preparation at home. With regard to smallpox, such due preparation could be made by universal vaccination. He quite agreed with Dr. Burnett Ham, that abstract resolutions with regard to quarantine were useless—and that what was needed was a proper system, and proper officers to carry it out. He (Mr. Mault) thought that the Venice Convention afforded a good basis for such a system if properly understood; but he could not understand the wisdom of such limitations of its provisions as were approved by Dr. Gresswell. Under the Convention, every encouragement was given to the shipping companies to make all proper provision for the isolation and treatment of infectious diseases, and the disinfection of infected clothing, by directing health officers to take such provision into account in the granting pratique. But at the Melbourne Conference of 1900, there was no discretionary power given to health officers to differentiate between the treatment of the cleanest, best-found mail steamer with a good medical staff, and foulest, worst-found labour vessel without any sanitary accommodation or appliances. He further thought that, with regard to smallpox, no quarantine or medical inspection would be sufficient without legislation securing universal vaccination.

Dr. Hayward (S.A.) pointed out that cases of smallpox had been introduced to Australasia despite the existence of quarantine regulations. The doctors on the boats had not such a light task, and were naturally biassed in favour of diagnosing a disease as one of mild type.

Dr. Kendall (N.S.W.) referred to the absurdity of the quarantine stations unless they were located on some isolated islands.

Dr. Ham admitted that a system of medical inspection might also allow a disease to enter a country, as was shown by the existence of smallpox in London.

Dr. Cherry thought that the following resolution might be agreed to:—"That in the opinion of this Congress vaccination should be uniformly enforced throughout the States, with a view to the early alteration of existing quarantine regulations, and the Federal Parliament be requested to initiate requisite legislation to give effect to this resolution."

This motion was agreed to.

Mr Mault suggested that the committee should request the health authorities of all the States to formulate their views upon the question of adopting the Venice Convention.

SIX MONTHS' DAILY EXAMINATION OF MELBOURNE TAP WATER.

BY

Thomas Cherry, M.D., M.S.,
Lecturer in Bacteriology, the University of Melbourne; Bacteriologist to the Department of Agriculture.

Before giving the results of the examinations of the Melbourne Water-supply, a short description of the sources of the water and of the reticulation is necessary in order to explain the results obtained.

Melbourne is probably unique among the large cities of the world in being supplied with water which comes from uninhabited catchment areas. The water-supply consists of two systems—the Yan Yean and the Maroondah. The Yan Yean system collects the water from the northern slopes of the Dividing Range in the neighbourhood of Mount Disappointment, about 30 miles north of the city. This catchment comprises 26,500 acres. The most distant source is the Silver Creek, the water is conveyed in an open aqueduct, 8 miles long, to the Wallaby Creek Weir. From this point the combined waters of the Wallaby and Silver Creeks are conveyed by a similar aqueduct for 5 miles to the southern crest of the Dividing Range, at a height of 1700 feet above sea level. The water is then dropped by a series of cascades into the bed of Jack's Creek, one of the branches of the Plenty River. Jack's Creek leads to Toorourong Reservoir, with a storage capacity of 60,000,000 gallons, whence a clear water channel nearly 5 miles long leads to the Yan Yean Reservoir. The average flow from Silver Creek is five, and from Wallaby Creek 7,000,000 gallons a day.

The Yan Yean Reservoir is 600 feet above sea-level. It covers an area of 1360 acres, with an available depth of 18 feet, and a storage capacity of 6,400,000,000 gallons. The face of the embankment and a considerable extent of the shores of the reservoir have been pitched in order to prevent discolouring of the water with the action of the waves upon the banks. From the Yan Yean Reservoir to the pipe head dam at Morang the water is conveyed in an open aqueduct, 7 miles long, and capable of delivering 33,000,000 gallons a day. From this point the water is conveyed by pipes to the local distributing and storage reservoirs. The chief of these is at Preston, 7 miles from Morang.

The Maroondah system is supplied by the Watts River and its tributaries at a point 45 miles to the north-east of Melbourne, and 3 miles beyond Healesville Railway Station. An aqueduct, 41 miles long, capable (as at present completed) of delivering 25,000,000 gallons a day, conveys the water to Preston Reservoir. As will be seen from the results of our examinations, the bacterial content of this water is practically identical with that from the Yan Yean catchment, but it reaches the consumer direct, while that from the Yan Yean system has the advantage of sedimentation during its storage in large reservoir.

All the aqueducts are built of stone set in cement, or of concrete, and elaborate precautions are taken to prevent the washing away of the banks or the entry of storm water into the channels. The catchment areas are uninhabited except by the caretakers, all the settlers having been bought out prior to 1887. There is very little animal life of any kind in the forests, and steps are taken to restrict the ingress of tourists. No public road enters the Yan Yean catchment, but the Maroondah catchment is traversed for 6 miles by the road from Healesville to Marysville. At the point where this

road crosses the Watts River the village of Fernshaw formerly stood, but all the houses have been removed, and the gardens and orchards allowed to return to a state of nature. The neighbourhood of this bridge is the only place where contamination of the water is likely to occur, and, as a matter of fact, the water below the bridge nearly always shows a few more organisms per cubic centimetre than that taken from the river above the former site of the houses. Whether this is to be accounted for by the drainage from the road or from the old cultivated grounds is a point on which I am not at present prepared to express an opinion. The whole of both catchments is covered with dense forest and undergrowth, and the annual rainfall varies at different points from 40 to 60 inches.

Methods.

All the samples of water were taken from one of the laboratory taps which is in constant use. The nearest large pipe is a 30-inch main which runs from the Preston Reservoir along the Sydney Road. From this about half a mile of 6-inch and 4-inch pipes along Grattan and Madeline Streets lead to the branch which supplies the laboratory.

The water was obtained as nearly as possible at 4 p.m., except on Saturdays and Sundays, when it was taken at noon. 5 c.c. were mixed in a flat glass dish, 7 inches in diameter, with 50 c.c. of nutrient gelatine. The plates were kept at 18° to 20° C., and examined after forty-eight and seventy-two hours. As far as possible the results of the last count of the colonies were taken, but in some cases the plates became liquefied in less than forty-eight hours. The average number of bacteria per c.c. was found by dividing the total number of colonies on the plate by 5. The observations extended from 4th July, 1901, to January 29, 1902.

Results.

Table I.

Average of Each Month.

——	No. of Examinations.	Total Number of Colonies.	Average per c.c.
July	25	7975	319
August	30	8887	296
September	30	2294	76
October	31	2586	83
November	29	1757	60
December	31	2219	71
January	23	4841	210

Total number of observations - - 199

Average of organisms per c.c. - - 154

Table II.

Number of Bacteria per Cubic Centimetre of Tap-water.

Day.	July.	August.	September.	October.	November.	December.	January.
1	—	316	53	35	24	56	60
2	—	200	24	12	40	82	86
3	—	6000	87	8	24	94	44
4	90	21	80	120	3	77	40
5	138	480	96	131	6	88	24
6	40	64	7	20	20	168	—
7	93	190	37	90	32	116	10
8	72	117	30	82	40	39	48
9	144	140	106	94	31	72	41
10	190	50	87	95	10	72	55
11	160	12	57	98	56	124	6
12	190	144	186	82	96	94	54
13	128	112	193	128	25	75	50
14	31	78	78	150	95	160	60
15	4800	88	16	101	48	3	141
16	76	55	99	156	78	3	124
17	147	44	48	128	57	64	11
18	90	43	150	121	73	86	—
19	—	72	76	57	41	72	21
20	84	89	67	150	80	60	116
21	30	94	38	73	76	40	112
22	108	44	30	52	80	51	—
23	600	86	100	100	74	80	—
24	124	101	288	112	—	62	23
25	124	28	46	68	179	41	3600
26	—	33	69	52	96	32	—
27	—	36	54	43	80	84	43
28	6	—	31	56	61	50	72
29	200	125	22	52	50	62	—
30	120	56	39	50	152	49	—
31	200	80	—	70	—	43	—

Remarks.

It will be observed that on three occasions the average number of organisms rose to 4800, 6000, and 3600 per c.c. respectively. If these three are omitted the average for the 196 observations falls to 83 per c.c. Taking its average at 154 per c.c. the results are undoubtdly good for an unfiltered water supply; at 83 per c.c. they approach the best average results obtained by sand filtration. It will be seen that two of the three abnormal results occurred in the winter months, and the rainfall in the last half of July was unusualy heavy. The consequence is that more sediment is washed down the creeks, and the average number of organisms is raised. I am inclined to attribute the three large numbers to a little particle of mud being taken up with the sample, but on the other hand the third case happened in January, when the rainfall and amount of sediment are both at the minimum. So far as we could ascertain there was no interference with the mains or reticulation pipes on these occasions. Leaving out of account the three anomalous results it will be seen that the number of organisms steadily fell from July to January, thus:—

July	132
August	99
September	76
October	83
November	60
December	71
January	54

As will be seen from the following tables the tap-water contains a smaller number of organisms than the mountain creeks. It is considerably higher than the average of the outlet of the Yan Yean Reservoir, or of the Surrey Hills and Caulfield local reservoirs, which are supplied direct from the Yan Yean. As previously explained nearly half the water supplied to Melbourne does not pass through the Yan Yean Reservoir, and therefore loses the advantage of sedimentation. Moreover, the Maroondah water is supplied chiefly in the winter, so as to allow of the large reservoir to be filled ready for summer consumption. This probably accounts for the average improvement as the summer approaches, the results of the examinations of the creeks showing little variation in summer and winter, unless the water was actualy discoloured by recent rain. For the same reason the number of micro-organisms bears no direct relation to the temperature of the water. For purposes of comparison the results of the examination of London water are appended.

Table III.

Results of Examinations of Creeks in Catchment-area during 1901.

—	March.	April.	June.	December.
Yan Yean Catchment—				
Silver	200	112	—	200
Wallaby	40	196	—	256
Jack's	160	190	—	205
Maroondah Catchment—				
Watt's above Fernshaw	—	—	191	126
Watt's below Fernshaw	—	—	187	141
Graceburn	—	—	195	160
Donelly's	—	—	—	120
Intake at Maroondah Weir	—	—	220	175

Table IV.

Results of Examinations of Reservoirs during 1901.

—	March.	April.	June.	October.	Dec'ber.
Yan Yean outlet	49	28	—	—	14
Surrey Hills Local Reservoir	80	—	52	90	31
Caulfield ,, ,,	25	—	75	41	42
Essendon ,, ,,	54	—	100	20	40

Table V.

London Water.—Average Monthly Bacterial Content in 1901.

From the Official Reports on the Condition of the Metropolitan Water-supply during the Month of December, 1901.

Month.	Thames, Unfiltered.	Thames derived, Companies' filtered.	New River, unfiltered.	New River, filtered.	River Lee unfiltered.	River Lee filtered.
January - -	4069	49	671	28	450	16
February - -	5310	26	800	5	172	18
March - - -	2303	27	593	10	315	43
April - - -	2076	15	176	6	177	15
May - - -	852	9	106	6	209	13
June - - -	1371	26	204	8	488	56
July - - -	5560	35	383	13	837	40
August - - -	1646	22	284	13	223	16
September - -	873	19	215	7	266	17
October - - -	865	13	173	4	155	12
November- - -	1909	55	280	10	202	13
December - - -	4065	31	387	18	446	14
Average - - -	2575	24	356	10	328	22

[Note.—The above are the results of 6893 examinations. The samples of the filtered water were taken from the clear water-wells of the various Companies.—T.C.]

Discussion.

Dr. Ham (Brisbane) congratulated Melbourne on having such a pure water-supply. In his city they had some thousands of germs in the water per cubic centimeter.

Dr. McDouall asked if the great amount of sunlight in Australia helped to purify the water?

Dr. Cherry did not think so. All depended on the influence of sedimentation. In slow-running rivers with large bodies of water, like the Goulburn, the sedimentation was good.

Dr. Jamieson (Melbourne) was very sceptical about the improved water-supply of Melbourne having tended to reduce cases of typhoid. The improvement had mostly been as to reticulation. Parts of Melbourne up to two or three years ago were great typhoid centres. Since then there had been a striking decrease, till the typhoid rate had fallen to as low as the London rate, and that was saying a great deal. He attributed this great improvement to deep drainage. (Applause.) Port Melbourne, until it had been drained, was a great typhoid centre. but since then they scarcely got a case there. The years when that and other parts of Melbourne, now drained, were most free from typhoid, showed more cases by very many than since deep drainage had been established.

NOTES ON THE OCCURRENCE OF TUBERCLE BACILLI IN THE MELBOURNE MILK-SUPPLY.

BY

THOMAS CHERRY, M.D., M.S.

DURING the past eighteen months two series of inoculations of guinea-pigs have been made at the University Laboratory, with the view of ascertaining the prevalence of tubercle bacilli in the Melbourne milk-supply.

In the first case thirty-six samples were obtained, and after centrifuging, $\frac{1}{2}$ c.c. of the sediment was inoculated into each of two guinea-pigs, the one subcutaneously, the other into the peritoneal cavity. One animal only died of disseminated tubercle; two others died with localised lesions, in which the bacilli-like tubercle bacilli were found. In the light of recent research, these were probably some form of acid fast bacillus, not the bacillus tuberculosis.

In the second series fifty-four samples were used, and both the animals injected with each sample were inoculated into the peritoneal cavity, the first with 5 c.c. of the fresh milk, the second with 5 c.c. of the milk from the bottom of the vessel after standing twenty-four hours in the cold. Two samples produced general tuberculosis. Twelve animals out of the one hundred and eight died of acute peritonitis, a result due to the multiplication which took place while the milk was allowed to stand.

It will thus be seen that three samples out of ninety (two of which came from the same dairy herd) contained bacilli capable of setting up acute tuberculosis in guinea-pigs; that is an average of 3·3 per cent.

This result must be regarded as very satisfactory for a city milk-supply. The first series of experiments was undertaken for the Board of Public Health: the second for the City Council.

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